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COMPOUNDS & ADVANCED SILICON

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Infineon on track for GaN on 300mm wafers by Q4/2025

Wolfspeed enters bankruptcy • Renesas abandoning SiC production
TSMC exiting GaN foundry production; Navitas turns to PSMC

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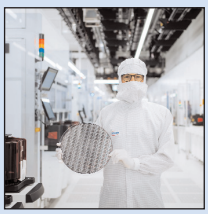

Cover image: Infineon Technologies says that its scalable gallium nitride manufacturing on 300mm wafers is on track for first samples to be available to customers as of fourth-quarter 2025. **p18**

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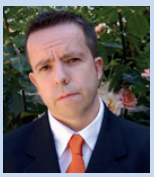

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- feature articles (technology, markets,
- regional profiles);
- conference reports;
- event calendar and event previews;
- suppliers' directory.

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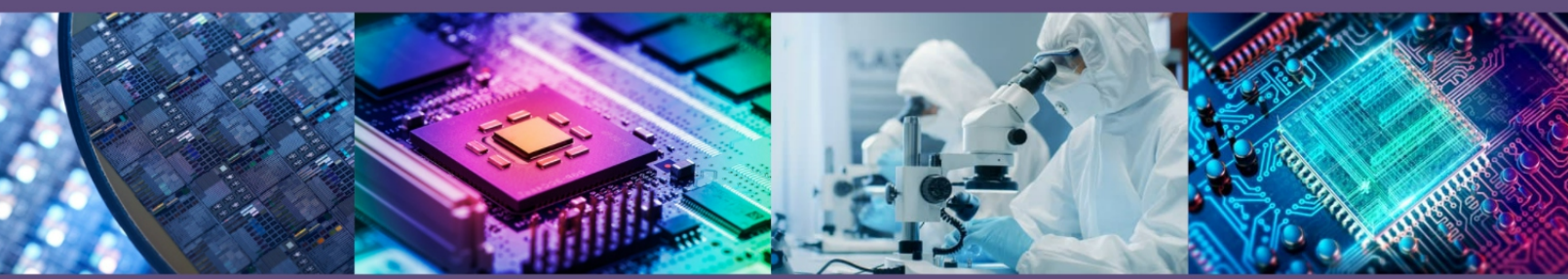

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Smartphone production at 289 million units in Q1

Output buoyed by China's consumer subsidy program, says TrendForce

Global smartphone production reached 289 million units in first-quarter 2025, says market research firm TrendForce. Compared to Q1/2024, the figures represent a 3% decline. However, in China, sales in Q1 were boosted by an ongoing consumer subsidy program.

Looking ahead to Q2, uncertainty surrounding the global political and economic landscape is expected to dampen consumer demand, resulting in a flat production outlook compared to Q1, says TrendForce.

Q1 marked the return of Samsung to the top position, with production increasing 21% quarter-over-quarter (QoQ) to reach 64 million units. Growth was driven by preparations for flagship model launches and a production ramp-up in response to new US tariffs.

Apple took the second spot with 48 million units produced, representing a 40% QoQ decline as shipments of its latest models tapered off. Most of Apple's products fall outside the scope of China's subsidies and face stiff competition in the Chinese market, contributing to a significant drop in Q1 market share. In contrast, US sales were pulled forward due to tariff concerns, though this may weaken demand later in the year.

1Q25 Global Smartphone Production by Leading Brands (unit: million)

Ranking	Brand	Production	QoQ	Market share
1	Samsung	64	21%	22%
2	Apple	48	-40%	17%
3	Xiaomi	42	-7%	14%
4	Oppo	27	-26%	9%
5	Vivo	24	-16%	8%
6	Transsion	22	-20%	7%

Xiaomi (including sub-brands Redmi and Poco) maintained third place with nearly 42 million units produced. The brand's comprehensive product portfolio across premium, mid-range, and entry-level segments, combined with the boost from China's subsidies, led to solid Q1 performance. Additionally, its integrated product ecosystem—spanning smartphones, smart homes, and EVs—bolstered Xiaomi's market positioning and supported sales of high-end models.

Oppo (including OnePlus and Realme) ranked fourth, producing around 27 million units. This marks a 26% QoQ and 19% YoY decline, primarily driven by inventory adjustments. The brand has been actively expanding in overseas markets such as Europe and South America. Realme, in particular, has gained traction among younger consumers in South America with its affordable and stylish designs.

Vivo (including iQoo) produced 24 million units in Q1. With sales concentrated in China, Vivo also benefited from the subsidy program to achieve year-over-year production growth.

Transsion (including TECNO, Infinix, and itel) ranked sixth with nearly 22 million units, a 20% QoQ drop. The company did not benefit from subsidy-driven demand as its sales remain focused on emerging markets outside China. Increased investment by competitors in regions like Africa and Central Asia, combined with a high base effect from inventory replenishment in 1Q24, led to a sharper 28% YoY decline in production.

www.trendforce.com

CSA Catapult to mobilize new UK Semiconductor Centre

The UK Government says that Compound Semiconductor Applications (CSA) Catapult will mobilize the new UK Semiconductor Centre (UKSC).

This comes with publication of the Government's modern Industrial Strategy, which includes a new Digital and Technology Sector Plan to unleash the UK's strengths in science and innovation. The Plan sets out how government will work alongside business to turn breakthrough ideas into enterprises, while attracting global tech investment.

For semiconductors, it reinforces the UK's long-term commitment to the sector — from supporting innovation and research to building stronger supply chains and helping more UK firms scale up and compete globally.

CSA Catapult will draw on its expertise across the semiconductor supply chain and its extensive network with industry and academia to help get the UKSC up and running.

Established in 2018 by government agency Innovate UK, CSA Catapult is a not-for-profit center of excellence that specializes in the measurement, characterization, integration and validation of compound semiconductor technology spanning power electronics, advanced packaging, RF & microwave, and photonics applications.

The new Centre is backed by at least £19m in government funding and will have an office in a location that is readily accessible for the UK's semiconductor clusters and international visitors. It will be guided by an independent advisory board.

Secondments from industry will also shape early activities, ensuring alignment with sector priorities and strong industry engagement.

The UKSC will serve as a national independent hub gathering industry, researchers, and government to make it easier for semiconductor firms to scale, secure investment and find the skills they need to grow.

It will also act as a front door for international collaboration, offering a single point of contact for global firms and governments to engage with the UK semiconductor sector and form partnerships to help strengthen the UK's role in global supply chains.

The outcomes-focused Centre will undertake several activities including the creation of R&D roadmaps, establishment of communities of practice around core semiconductor technologies, skills development, improving access to venture funds and scaling up semiconductor SMEs.

CSA Catapult will engage with stakeholders through roadshows in summer and autumn to outline the UKSC's priorities and activities.

"Semiconductors power everything from smartphones to medical devices — and with the right support, the UK can play a much bigger role in their supply and development," says UK Science Minister Lord Vallance. "We're backing the long-term growth of this vital industry with a new national centre to boost investment, strengthen collaboration, and build skills to support the economic growth at the heart of our Plan for Change. We want industry at the heart of this effort, and we're working with experts from across the sector to make sure the UK Semiconductor Centre delivers what businesses need to thrive."

"Semiconductors are enabling technology for AI, net zero, mobility, quantum, neuromorphic computing and defence and they underpin the UK's Plan for Growth," says CSA Catapult's interim CEO Raj Gawera. "The new UK Semiconductor Centre will play a pivotal role in creating a stronger, more connected UK semiconductor innovation ecosystem. The centre will build on the UK's recognised strengths in design, IP, advanced packaging and compound semiconductors and leverage existing semiconductor clusters in Scotland, Northern Ireland, Cambridge, South Wales, the North East, Bristol and Southampton," he adds.

"In close collaboration with industry, academia and government, the Centre aims to drive growth and scale of strategic technologies from materials to devices to applications. CSA Catapult, with the support of Innovate UK and DSIT, is pleased to play a strategic role in mobilizing and establishing the UK Semiconductor Centre and working closely with stakeholders to shape detailed plans."

"As outlined in our report UK Plan For Chips, we believe the Centre will be key to delivering skills, supporting international collaboration, and strengthening regional clusters — from photonics in Northern Ireland, design and IP in Cambridge, to compound semiconductors in Wales," says techUK's CEO Julian David OBE. "As we move towards next steps, techUK would like to see the Centre become an independent, authoritative and empowered voice, with the ability to represent and unite UK industry alongside global partners."

"Since the birth of the integrated circuit in the 1960s the UK has been a pioneer in semiconductor innovation. Yet, we have failed to consistently turn that innovation into sustained commercial and competitive advantage compared to other leading nations," notes Techworks' CEO Charles Sturman. "This matters because semiconductors have evolved from a useful technology into an essential component of our way of life, becoming crucial to our sustained wellbeing.

"A strong semiconductor industry is vital to any developed country's economic security. To this end, the UK must unite around a shared, long-term strategy that drives innovation, investment, skills and scale up — building on our strengths to seize global growth opportunities," Sturman adds.

"As the UK's semiconductor trade association, I am proud to see government not only delivering on their promise to support the sector but also engaging with us to convene industry dialogue and address stakeholder concerns. We must ensure that this new body delivers real value to the actors it aims to support."

Those across the sector interested in joining the advisory group or taking up a secondment can contact recruitment@uksemicentre.org.uk

www.csa.catapult.org.uk

Pragmatic appoints John Quigley as executive VP of engineering

Strategic technology and global engineering leader joins FlexIC firm, enabling sustainable edge and item-level intelligence at scale

Flexible integrated circuit (FlexIC) designer and manufacturer Pragmatic Semiconductor Ltd of Cambridge, UK has appointed John Quigley as executive VP of engineering with responsibility for technology development, IC design and applications engineering.

With an career of over 35 years in the semiconductor and technology sector spanning engineering, operational and leadership roles, Quigley brings technical domain expertise to Pragmatic, in addition to experience leading and scaling technology and product portfolios in large public and growth businesses on a global scale.

Most recently, Quigley was senior VP of R&D, microprocessor & microcontroller engineering at NXP Semiconductors, with operational and strategic leadership responsibility for large global engineering organizations. During his decade-long tenure at NXP, he spearheaded the technical leadership of much of the firm's RF and mobile product portfolio, including overall engineering leadership for their RFID product and secure mobile platform portfolio. Prior experience includes senior global engineering and leadership roles at Quantenna, Ikanos Communications, SiRF Technology, and Airgo Networks following almost 15 years at Motorola. Quigley has relocated from the USA to be based in the firm's headquarters in Cambridge, UK.

"He joins us at an extremely exciting time, during a period of rapid growth, as we service global customer demand through the delivery our innovative FlexIC technology via our products, platforms, and advanced manufacturing," says CEO David Moore. "John's deep technical expertise, significant industry experience, and track record of scaling technology and leading successful engineering teams around the world, coupled with his extensive experience partnering with large global customers to deliver industry-leading solutions to market, will be of enormous strategic value to the company," he reckons.

www.pragmaticsemi.com

Maruyama becomes pSemi CEO as Tatsuo Bizen retires

Keith Bargroff promoted to senior VP, engineering & technology; Joel Keller to senior VP, administration; Taro Desaki to VP, corporate planning & business operations

Murata company pSemi Corp of San Diego, CA, USA — a fabless provider of radio-frequency (RF), analog and mixed-signal solutions — has announced leadership changes and organizational restructuring to support its evolving business strategy and future growth.

After a 40-year career, Tatsuo Bizen has retired as CEO of pSemi and VP of Murata Manufacturing Company Ltd's (MMC) power modules division, but continues in a corporate advisor role at MMC.

Since joining Murata in 1985 as an RF engineer, Bizen has held leadership positions across its global operations, including product management in Europe, head of corporate global marketing, and in CEO roles at acquired companies SyChip, Murata Power Solutions, and pSemi. His leadership has played a crucial role in stabilizing and strengthening businesses across multiple regions and product areas, comments the firm.

Go Maruyama has assumed the role of CEO of pSemi, after nearly three decades of experience within Murata and its subsidiaries. He began his career in corporate planning and has held positions in marketing, business development, and product management in both Japan and China. Since joining pSemi in 2017, he has played a key role in corporate strategy and post-merger integration. In his new role, he will lead pSemi into its next phase of collaboration with Murata and its affiliates.

"My focus will be on fostering a culture of collaboration between Murata and pSemi, increasing our agility, and striving for continuous growth as we expand our impact in the semiconductor industry," says Maruyama.

To support pSemi's evolving business strategy, the firm also announced several key leadership promotions:

- Keith Bargroff has been promoted to senior VP, engineering and technology;
- Joel Keller has been promoted to senior VP, administration;
- Taro Desaki has been promoted to VP, corporate planning and business operations.

The promotions align with pSemi's commitment to strengthen administrative functions, accelerate R&D, and enhance RFFE (radio-frequency front-end) and power management IC technology competitiveness through closer collaboration with Murata companies and other affiliates, including Eta Wireless.

www.psemi.com

onsemi to establish wide-bandgap materials research center at Stony Brook University

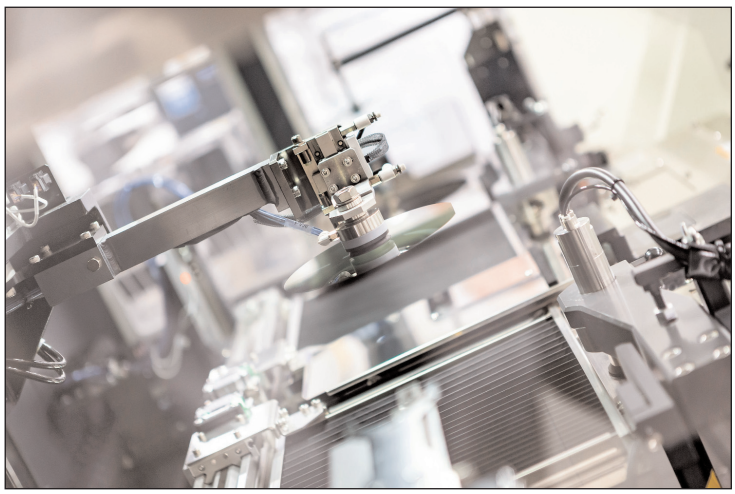
Investment supports materials research and workforce development in New York to address growing power needs of AI and electrification

Intelligent power and sensing technology firm onsemi of Scottsdale, AZ, USA plans to invest $8m with Stony Brook University to establish a wide-bandgap research center to advance innovation in power semiconductors and foster the next generation of skilled professionals in the field.

The investment is part of a broader $20m strategic collaboration with Stony Brook University and Empire State Development aimed at positioning New York as a national hub for power semiconductor innovation.

The center aims to advance foundational research in silicon carbide and other wide-bandgap materials and device-enabling technologies — capabilities critical to improving energy efficiency in AI and electrification. Expected to be fully operational in early 2027, the facility will feature specialized laboratories and advanced instrumentation for materials development, device integration, and performance characterization.

"Advanced power semiconductors are at the core of enabling the widespread adoption of AI and electrification. This new center will play a key role in accelerating innovation in one of the most critical fields for these global megatrends," says Dinesh Ramanathan, senior VP of corporate strategy. "Aligned with Governor Hochul's vision, and in strong partnership with Stony Brook and Empire State Development, we are building a pipeline of skilled



talent who will drive the next wave of breakthroughs in power semiconductors and pave the way for our sustainable future," he adds.

"The state-of-the-art research facility at Stony Brook University will be another step in our mission to reshore the chip industry, strengthen our national security, and cement New York's status as the chips capital of the USA," says New York State Governor Kathy Hochul. "By investing in cutting-edge technology and world-class talent, we're building a stronger, more resilient future for Long Island, and New York."

As part of the collaboration, Stony Brook University is developing a curriculum for an undergraduate minor and a graduate master's degree and certificate in silicon carbide and wide-bandgap semiconductors.

"This public–private partnership between onsemi, Stony Brook and Empire State Development has tremendous implications for economic development and national security," believes incoming Stony Brook University president Andrea Goldsmith. "As a technology entrepreneur and the founder of a fabless semiconductor startup, I am thrilled that Stony Brook is a key academic partner with onsemi, an industry leader in power semiconductors. This partnership places Stony Brook and New York State at the forefront of advancing power semiconductor technology while providing students hands-on research and practical opportunities as they prepare for leadership roles in high-skill, high-demand technology fields."

Empire State Development is supporting the effort as part of New York's broader strategy to revitalize domestic semiconductor capabilities and workforce development.

The new center will be led by Stony Brook professor Michael Dudley, a leading researcher in SiC growth and a member of the university's Department of Materials Science & Chemical Engineering, in partnership with fellow professors Balaji Raghothamachar and Dilip Gersappe.

www.onsemi.com

Wolfspeed to emerge from Chapter 11 bankruptcy by Q4

To strengthen its capital structure, Wolfspeed Inc of Durham, NC, USA — which makes silicon carbide (SiC) materials and power semiconductor devices — has entered into a restructuring support agreement (RSA) with key lenders, including

- holders of more than 97% of its senior secured notes,
- Renesas Electronics Corp's US subsidiary, and
- convertible debtholders holding over 67% of outstanding convertible notes.

The transactions are expected to cut overall debt of $6.5bn by 70% ($4.6bn) and cut annual total cash interest payments by about 60%.

As a result, Wolfspeed expects to be better positioned to execute on its long-term growth strategy and accelerate its path to profitability. This marks the culmination of discussions between the Wolfspeed and key lenders to restructure its capital structure on an expedited basis and to help to ensure that the firm maintains its position as a leader in the silicon carbide market.

"After evaluating potential options to strengthen our balance sheet and right-size our capital structure, we have decided to take this strategic step because we believe it will put Wolfspeed in the best position possible for the future," says CEO Robert Feurle. "We are a global leader in silicon carbide technology with an exceptional, purpose-built, fully automated 200mm manufacturing footprint, delivering cutting-edge products," he adds. "A stronger financial foundation will enable us to focus acutely on innovation in rapidly scaling verticals undergoing electrification where quality, durability and efficiency matter most."

Key terms of the RSA are as follows:

- Wolfspeed will receive $275m of new financing in second lien convertible notes, fully backstopped by certain existing convertible debtholders.
- The RSA contemplates a paydown of its senior secured notes of $250m at a rate of 109.875%, with certain modifications to reduce go-forward cash interest and minimum liquidity requirements.
- The RSA also sees an exchange of $5.2bn of existing convertible notes and Renesas' existing loan for $500m of new notes and 95% of the new common equity, subject to dilution from other equity issuances, with Renesas loan claims entitled to additional incremental consideration if certain regulatory approvals are not obtained by an agreed deadline.
- Existing equity will be cancelled, and the existing equity holders will receive their pro rata share of 3% or 5% of new common equity, subject to dilution from other equity issuances and potential reduction from certain events.
- All other unsecured creditors are expected to be paid in the ordinary course of business.

To implement the transactions envisioned by the RSA, Wolfspeed has filed voluntary petitions for reorganization under Chapter 11 of the US Bankruptcy Code. The firm expects to emerge from this by the end of third-quarter 2025.

Wolfspeed says it is continuing to operate and serve customers with SiC materials and devices throughout the process. It plans to continue to pay vendors in the ordinary course of business for goods and services delivered throughout the restructuring process via an All-Trade Motion. Vendors are expected to be unimpaired. Wolfspeed also intends to file customary motions with the Bankruptcy Court to support ordinary-course operations including, but not limited to, continuing employee compensation and benefits programs.

www.wolfspeedforward.com

Former NXP and ams OSRAM executive named as CFO

Wolfspeed has appointed Gregor van Issum as chief financial officer, effective 1 September. He succeeds interim CFO Kevin Speirits, who will remain with Wolfspeed to ensure a smooth transition. van Issum will relocate to North Carolina and be based in Durham, reporting to CEO Robert Feurle.

van Issum has over 20 years of experience in transformational restructuring and strategic financing roles across the tech industry. In senior roles at ams OSRAM AG and NXP Semiconductors N.V., he gained an understanding of how to lead organizations through dynamic business cycles, says Wolfspeed.

Most recently, van Issum was executive VP, group controller at ams OSRAM, involved in driving the financial performance of the multi-billion-Euro revenue firm. He also led ams OSRAM's cost-savings programs and sales initiatives in his dual role as chief transformation & performance officer.

"I witnessed Gregor's strong analytical and leadership skills firsthand during our time working together at ams OSRAM," says Feurle. "Gregor has helped lead large, multi-billion-euro businesses with complex manufacturing operations, which will be invaluable to Wolfspeed as we unlock the potential of our purpose-built 200mm platform," he adds. "I look forward to collaborating with Gregor as we position Wolfspeed for long-term growth and profitability."

van Issum gained merger & acquisition and IT experience at ams OSRAM, where he was responsible for executing and delivering on the business targets for the transactions and managing the strategic direction of the firm's systems. He was previously VP, strategy of NXP Semiconductors' Secure Transactions and Identification Solutions segment ,and CFO of the Secure Identification Solutions and Analog Mixed Signal units.

Renesas abandoning SiC production plans amid Chinese price war and Wolfspeed uncertainty

Silicon carbide team at Takasaki plant disbanded

According to a report by Nikkei, Renesas Electronics Corp of Tokyo, Japan is abandoning its plans to produce silicon carbide (SiC) power semiconductors for electric vehicles (EVs), due to slowing growth in the EV market — coupled with a supply glut driven by increased production from Chinese manufacturers — that has led to falling prices.

In July 2023, Renesas announced its plans to enter the SiC power device market and begin manufacturing SiC power chips in early 2025 at its Takasaki plant in Gunma Prefecture. However, the firm has since disbanded the SiC team there.

Nikkei adds that price competition with Chinese rivals is expected to intensify over the medium to long term, making it difficult for Renesas — as a latecomer — to generate quick profits from SiC chip production.

According to the latest research by market analyst firm TrendForce, weakening demand in the automotive and industrial sectors has slowed shipment growth for SiC substrates in 2024. Simultaneously, intensifying competition and sharp price declines have driven global revenue for N-type SiC substrates down by 9% year-on-year to US$1.04bn. Notably, Chinese vendors TanKeBlue and SICC have rapidly risen to prominence, capturing 17.3% and 17.1% of global market share, respectively.

On the other hand, as highlighted by Nikkan Kogyo Shimbun, Renesas could face repercussions due to its 10-year deal, signed in July 2023 (involving a US$2bn upfront deposit), for Wolfspeed Inc of Durham, NC, USA to supply it with 150mm- and 200mm-diameter SiC substrates and epiwafers. Wolfspeed is said to be preparing to file for Chapter 11 bankruptcy. In this eventuality, Renesas may be forced to recognize impairment losses, the report suggests.

While the pressure from Wolfspeed's financial troubles and intensifying competition from Chinese rivals has caused Renesas to halt in-house production of SiC power chips, the firm does not plan to exit the market entirely, notes TrendForce. Instead, it may continue to develop its own SiC designs while outsourcing manufacturing to foundries, then sell the finished products under its own brand.

www.trendforce.com

Renesas' $1.7bn first-half loss from Wolfspeed

Renesas' $2.062bn deposit to be converted into convertible notes, common stock and warrants

As a result of entering into a restructuring support agreement with Wolfspeed and its principal creditors, Tokyo-based Renesas expects to record a financial loss.

In July 2023, Renesas said that it had entered into a silicon carbide (SiC) wafer supply agreement with Wolfspeed and, via its US subsidiary, it provided Wolfspeed with a deposit of $2bn (about ¥292bn), raised in October 2024 to $2.062bn (about ¥301.1bn).

On 8 May, Wolfspeed said that, to achieve its goal of strengthening its balance sheet, it would implement a transaction through an in-court solution, including required "going concern" language in its quarterly financial statements.

In response, Renesas entered into the restructuring support agreement, which involves converting the $2.062bn deposit into convertible notes, common stock and warrants issued by Wolfspeed, as follows:

- Wolfspeed convertible notes: $204m (¥29.8bn), convertible to Wolfspeed common stock, maturing in June 2031. These notes are convertible into 13.6% of Wolfspeed's total issued shares on a non-diluted basis on completion of the restructuring. On a fully diluted basis, prior to the exercise of the warrants to be granted to Renesas, this corresponds to 11.8%.
- Wolfspeed common stock: equivalent to 38.7% (17.9% on a fully diluted basis, prior to Renesas warrants exercise) of the total number of issued shares of Wolfspeed at completion of the restructuring.
- Wolfspeed warrants: equivalent to 5% (on a fully diluted basis) of the total number of issued shares of Wolfspeed at the completion of the restructuring.

The restructuring is expected to become effective by the end of September, subject to court approval of the plan. If the necessary regulatory approvals have not been obtained by this time, then Renesas will hold rights to instruments with equivalent economic value to Wolfspeed's convertible notes, common stock and warrants until those approvals are received.

In connection with the signing of the restructuring support agreement, in its consolidated financial statements for first-half 2025 Renesas expects to record a loss on the deposited receivables related to the deposit of about ¥250bn ($1.7bn, at an average exchange rate of ¥150 to the dollar during the period).

www.renesas.com
www.wolfspeed.com

Renesas adds 650V GaN FETs for high-density power conversion

SuperGaN-based 650V Gen IV Plus devices target AI data centers, industrial and charging systems

Renesas Electronics Corp of Tokyo, Japan has introduced three new high-voltage 650V gallium nitride (GaN) FETs for AI data centers and server power supply systems including the new 800V HVDC architecture, E-mobility charging, UPS battery backup devices, battery energy storage and solar inverters.

Designed for multi-kilowatt-class applications, the fourth-generation plus (Gen IV Plus) devices combine high-efficiency GaN technology with a silicon-compatible gate drive input, significantly reducing switching power loss while retaining the operating simplicity of silicon FETs. Offered in TOLT, TO-247 and TOLL package options, the devices give engineers the flexibility to customize their thermal management and board design for specific power architectures.

The new TP65H030G4PRS, TP65H030G4PWS and TP65H030G4PQS devices leverage the robust SuperGaN platform, a field-proven depletion-mode (d-mode) normally-off architecture pioneered by Transphorm, which was acquired by Renesas in June 2024. Based on low-loss d-mode technology, the devices offer what is claimed to be superior efficiency over silicon, silicon carbide (SiC) and other GaN offerings. Moreover, they minimize power loss with lower gate charge, output capacitance, crossover loss, and dynamic resistance impact, with a higher 4V threshold voltage, which is not achievable with existing enhancement-mode (e-mode) GaN devices.

Fabricated on a die 14% smaller than the previous Gen IV platform, the new Gen IV Plus products achieve a lower $R_{DS(on)}$ of 30mΩ, reducing on-resistance by 14% and delivering a 20% improvement in on-resistance output-capacitance-product figure of merit (FOM). The smaller die size reduces system costs and lowers output capacitance, which results in higher efficiency and power density. These advantages make the Gen IV Plus devices suitable for cost-conscious, thermally demanding applications where high performance, efficiency and small footprint are critical, says Renesas. They are fully compatible with existing designs for easy upgrades, while preserving existing engineering investments.

Available in compact TOLT, TO-247 and TOLL packages, they are claimed to provide one of the broadest packaging options to accommodate thermal performance and layout optimization for power systems ranging from 1kW to 10kW, and even higher with paralleling. The new surface-mount packages include bottom-side (TOLL) and top-side (TOLT) thermal conduction paths for cooler case temperatures, allowing easier device paralleling when higher conduction currents are needed. Further, the commonly used TO-247 package provides higher thermal capability to achieve higher power.

"The rollout of Gen IV Plus GaN devices marks the first major new product milestone since Renesas' acquisition of Transphorm last year," notes Primit Parikh, VP of the GaN business division at Renesas. "Future versions will combine the field-proven SuperGaN technology with our drivers and controllers to deliver complete power solutions," he adds. "Whether used as standalone FETs or integrated into complete system solution designs with Renesas controllers or drivers, these devices will provide a clear path to designing products with higher power density, reduced footprint and better efficiency at a lower total system cost."

D-mode normally-off design for reliability and easy integration

Like previous d-mode GaN products, the new Renesas devices use an integrated low-voltage silicon MOSFET – a unique configuration that achieves seamless normally-off operation while fully capturing the low-loss, high-efficiency switching benefits of the high-voltage GaN. As they use silicon FETs for the input stage, SuperGaN FETs are easy to drive with standard off-the-shelf gate drivers rather than specialized drivers that are normally required for e-mode GaN. This compatibility simplifies design and lowers the barrier to GaN adaptation for system developers, the firm says.

GaN-based switching devices are quickly growing as key technologies for next-generation power semiconductors, fueled by demand from electric vehicles (EVs), inverters, AI data center servers, renewable energy, and industrial power conversion, notes Renesas. Compared with SiC and silicon-based semiconductor switching devices, they provide superior efficiency, higher switching frequency and smaller footprints, the firm adds.

Renesas claims that it is uniquely positioned in the GaN market due to solutions offering both high- and low-power GaN FETs, unlike many providers whose success in the field has been primarily limited to lower-power devices. A diverse portfolio enables it to serve a broader range of applications and customer needs, the firm adds. To date, Renesas has shipped over 20 million GaN devices for high- and low-power applications, representing more than 300bn hours of field usage.

The new devices are available now, along with the 4.2kW totem-pole PFC GaN Evaluation Platform (RTDTTP4200W066A-KIT).

www.renesas.com/gan-fets

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ROHM's SiC MOSFET adopted for mass production in Toyota's new BEV for Chinese market

Power module shipping from HAIMOSIC JV with Zhenghai Group

The power module equipped with Japan-based ROHM Co Ltd's fourth-generation silicon carbide (SiC) MOSFET bare chip has been adopted in the traction inverter of Toyota Motor Corp's new bZ5 crossover-type battery electric vehicle (BEV) for the Chinese market.

The bZ5 has been jointly developed by Toyota, BYD Toyota EV Technology Co Ltd (BTET) and FAW Toyota Motor Co Ltd, and was launched by FAW Toyota in June.

The power module adopted this time has started mass-production shipments from HAIMOSIC (Shanghai) Co Ltd — a joint venture between ROHM and Zhenghai Group Co Ltd (China) that is mainly engaged in the R&D, design and manufacturing of SiC power modules — with estimated annual capacity of 360,000 units/year. ROHM's power solutions, centered on SiC MOSFETs, contribute to the extended range and enhanced performance of the new BEV.

ROHM aims to complete the construction of the production line for the next-generation its fifth generation SiC MOSFETs by 2025, and is also accelerating market introduction plans for the sixth and seventh generations, focusing on the development of SiC power devices. The firm will continue to work on improving device performance and production efficiency, and strengthen the system to provide SiC in various forms such as bare chips, discrete components, and modules.

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

Resonac and Tohoku synthesizing silicon carbide powder from silicon sludge and carbon dioxide

SiC powder to provide raw material for growth of SiC single-crystal used in power semiconductors

The synthesis of silicon carbide (SiC) requires high temperatures and significant power, posing challenges in reducing the environmental impact of the manufacturing process.

To address this challenge, since last year Tokyo-based wafer manufacturer Resonac Corp and Japan's Tohoku University Graduate School of Engineering have been conducting fundamental research on the application of silicon carbide (SiC) powder — synthesized by reacting carbon dioxide (CO_2) with silicon sludge (generated during the silicon wafer manufacturing process) — as raw material for the growth of SiC single-crystal materials used in power semiconductors.

In this study, Tohoku University synthesized SiC powder by heating silicon sludge and CO_2 with microwaves at the carbon recycling demonstration research hub, while Resonac worked on applying the SiC powder to SiC single-crystal substrates. Recently, the fundamental research phase, including the characterization of the crystals, has been completed. Now, full-scale studies have been commenced, targeting practical applications.

The new technology applies carbon recycling techniques through 'mineralization', which involves reacting CO_2 with solid materials. By recycling both silicon sludge and CO_2, it creates raw materials for SiC. This approach is expected to serve as a low-environmental-impact technology, replacing conventional high-energy-consuming processes.

If this technology is commercialized, SiC power semiconductors will not only contribute to energy conservation as products but also enable reductions in CO_2 emissions, the recycling of silicon sludge and the reutilization of CO_2 simultaneously during the manufacturing process. This would reduce the overall environmental impact throughout the entire lifecycle of SiC power semiconductors.

"This technology, which enables the production of SiC wafers from CO_2 and silicon sludge, has a significant impact both on the supply chain and on reducing environmental burdens," says Yoshiteru Hosaka, theme leader, Technology Development Department, SiC Division, Device Solutions business unit, Resonac.

"The key feature of this process lies in its ability to transform CO_2, which is stable gas, into high-purity SiC with low energy consumption, offering a promising solution to both waste management and greenhouse-gas reduction," says Jun Fukushima, assistant professor, Department of Applied Chemistry, Graduate School of Engineering, Tohoku University.

"Looking ahead, we aim to expand its application across diverse fields such as electric vehicles and renewable energy sectors. By accumulating practical demonstrations, we seek to enhance industrial competitiveness and present concrete measures toward achieving carbon neutrality and a circular economy by 2050".

www.tohoku.ac.jp/english
www.resonac.com

ROHM's power devices supporting NVIDIA's new 800V high-voltage direct current architecture

ROHM working with data-center operators and power system designers for next-generation AI factories

Power semiconductor technology firm ROHM says that it is one of the key silicon providers supporting NVIDIA's new 800V High-Voltage Direct Current (HVDC) architecture. This marks a pivotal shift in data-center design, enabling megawatt-scale AI factories that are more efficient, scalable, and sustainable.

ROHM says that its power device portfolio spans both silicon and wide-bandgap technologies, including silicon carbide (SiC) and gallium nitride (GaN), offering a strategic path for data-center designers. Its silicon MOSFETs are already widely adopted across automotive and industrial sectors, providing a cost-effective and reliable solution for power conversion needs. These are suitable for applications where price, efficiency and reliability must be balanced, making them a fit for transitional stages of AI infrastructure development.

An example is the RY7P250BM, a 100V power MOSFET endorsed by major global cloud providers designed specifically for hot-swap circuits in 48V power systems — an essential component in AI servers. Key features include what is claimed to be best-in-class SOA (safe operating area) performance and ultra-low ON-resistance (1.86mΩ) in a compact 8080 package. These characteristics help to reduce power loss and improve system reliability — crucial requirements in high-density, high-availability cloud platforms. As data centers transition from 12V to 48V and beyond, hot-swap capability becomes critical for maintaining uptime and protecting against inrush currents.

Industrial-grade rectification with minimal losses is an area where ROHM's SiC devices align with NVIDIA's plans to begin large-scale deployment of its 800V HVDC data-center architecture to power 1MW compute racks and beyond. At the heart of NVIDIA's new infrastructure is the conversion of 13.8kV AC from the grid directly into 800V DC. The initiative is designed to address the inefficiencies of traditional 54V rack power systems, which are constrained by physical space, copper overload, and conversion losses.

ROHM's SiC MOSFETs deliver what is claimed to be superior performance in high-voltage, high-power environments, offering higher efficiency through reduced switching and conduction losses, greater thermal stability for compact, high-density systems, and proven reliability in mission-critical applications. These characteristics align with the requirements of the NVIDIA 800V HVDC architecture, which aims to reduce copper usage, minimize energy losses, and simplify power conversion across the data center.

Complementing SiC, ROHM is advancing gallium nitride technologies under its EcoGaN brand. While SiC is best-suited for high-voltage, high-current applications, GaN offers exceptional performance in the 100V to 650V range, with superior breakdown field strength, low ON-resistance, and ultra-fast switching. ROHM's broad EcoGaN lineup includes 150V and 650V GaN HEMTs, gate drivers, and integrated power stage ICs. At the same time, proprietary Nano Pulse Control technology further improves switching performance, reducing pulse widths to as low as 2ns. These innovations support the growing demand for smaller, more efficient power systems in AI data centers.

Beyond discrete devices, ROHM offers a lineup of high-power SiC modules, including top-side-cooling molded packages such as the HSDIP20, equipped with advanced 4th Gen SiC chips. These 1200V SiC modules are optimized for LLC topologies in AC–DC converters and primary-side applications in DC–DC converters. Engineered for high-efficiency, high-density power conversion, they are particularly well suited for the centralized power systems envisioned in NVIDIA's architecture. Their robust thermal performance and scalability make them suitable for 800V busways and MW-scale rack configurations.

www.rohm.com

Microchip partners with Delta on silicon carbide for power management

Microchip Technology Inc of Chandler, AZ, USA has announced a new partnership agreement for its mSiC products and technology to be used in the designs of global power and energy management firm Delta Electronics Inc. The synergies between the firms aim to accelerate the development of innovative silicon carbide (SiC) solutions, energy-saving products and systems.

"SiC is increasingly important in sustainable power solutions because of its wide-bandgap properties, which enable smaller and more efficient designs for high-voltage, high-power applications at a lower system cost," says Clayton Pillion, VP of Microchip's high-power solutions business unit. "We look forward to forging an impactful path with Delta Electronics on innovating SiC solutions to meet the rising demand of the electrification of everything."

Delta intends to leverage Microchip's experience and advanced technology in SiC and digital control to accelerate the time to market of its solutions for high-growth market segments such as AI, mobility, automation and infrastructure.

The agreement prioritizes the companies' resources to validate Microchip's mSiC solutions to fast-track implementation in Delta's designs and programs. Other key advantages are top-tier design support to include technical training, insight into R&D activities, and early access to product samples.

With over 20 years of experience in the development, design, manufacturing and support of SiC devices and power solutions, Microchip says that it helps customers to adopt SiC with ease, speed and confidence. Microchip's mSiC products include SiC MOSFETs, diodes and gate drivers with standard, modified and custom options.

www.deltaww.com
www.microchip.com

Vishay launches Gen 3 650V and 1200V SiC Schottky diodes in SlimSMA HV package

Vishay Intertechnology Inc of Malvern, PA, USA has launched three new Gen 3 650V and 1200V silicon carbide (SiC) Schottky diodes in the compact, low-profile SlimSMA HV (DO-221AC) package. Featuring a merged PIN Schottky (MPS) design and minimum creepage distance of 3.2mm, the 1A VS-3C01EJ12-M3 and the 2A VS-3C02EJ07-M3 and VS-3C02EJ12-M3 combine low capacitive charge with temperature-invariant switching behavior to increase efficiency in high-speed, hard-switching power designs.

For high-voltage applications, the high creepage distance of the new devices provides improved electrical isolation, while their SlimSMA HV package features a molding compound with a high CTI (comparative tracking index) of >600 to ensure excellent electrical insulation. For space-constrained designs, the diodes offer a low profile of 0.95mm, versus 2.3mm for SMA and SMB packages with a similar footprint.

Unlike silicon diodes, the VS-3C01EJ12-M3, VS-3C02EJ07-M3 and VS-3C02EJ12-M3 maintain a low capacitive charge down to 7.2nC irrespective of temperature, resulting in faster switching speeds, reduced power losses, and improved efficiency for high-frequency applications. In addition, the devices have virtually no recovery tail, which further improves efficiency, while their MPS structure delivers a reduced forward voltage drop down to 1.30V.

With a high operating temperature of +175°C, typical applications for the new diodes include bootstrap, anti-parallel and PFC diodes for DC/DC and AC/DC converters in server power supplies; energy generation and storage systems; industrial drives and tools; and x-ray generators. For easy paralleling in these applications, the devices offer a positive temperature coefficient.

RoHS-compliant and halogen-free, the diodes feature a moisture sensitivity level (MSL) of 1 in accordance with J-STD-020 and meet the JESD 201 class 2 whisker test.

Samples and production quantities of the new SiC diodes are available now, with lead times of 14 weeks.

www.vishay.com

Nexperia and TU Hamburg launch endowed chair

Discrete device designer and manufacturer Nexperia of Nijmegen, the Netherlands (which operates wafer fabs in Hamburg, Germany, and Hazel Grove Manchester, UK) and the Hamburg University of Technology (TU Hamburg) have launched an endowed professorship in power electronic devices. The position, held by professor Holger Kapels, will drive research on next-generation semiconductor components and train highly skilled engineers at TU Hamburg's School of Electrical Engineering, Computer Science and Mathematics. As part of this initiative, Kapels will also lead the newly founded Institute for Power Electronic Devices.

In his inaugural lecture 'Innovative Power Semiconductor Devices as a Key Technology for an Electrified Future', Kapels outlined how compound semiconductors based on silicon carbide (SiC) and gallium nitride (GaN) are enabling transformative improvements in energy efficiency — particularly in electric vehicles, industrial systems, and data centers. Wide-bandgap (WBG) materials such as SiC, GaN and aluminum scandium nitride (AlScN) allow higher switching frequencies, lower conduction losses, and more compact device footprints compared with traditional silicon.

The new institute will focus on power semiconductors based on silicon, SiC, GaN and aluminum scandium nitride (AlScN), new device architectures, including vertical GaN structures, and machine-learning-based fault prediction systems. Additional research priorities include modeling the reliability and ruggedness of power devices under extreme operating conditions.

Opening remarks at the event were delivered by TU Hamburg president professor Andreas Timm-Giel. Representing the Hamburg Senate, the State Secretary for Science Dr Eva Gümbel emphasized the broader impact of the new chair: "Power electronics are vital to sustainable energy supply and industrial innovation. With Kapels, TU Hamburg gains a leading researcher who will shape both science and education in this strategic field."

"This professorship is an investment in future technologies, in local talent, and in Hamburg as a center for semiconductor excellence," stressed Ansgar Thorns, vice president R&D at Nexperia Germany. "Fostering innovation and developing the next generation of engineers go hand in hand — and both are critical to strengthening our deep-tech ecosystem."

The new chair is part of Nexperia's long-term innovation strategy. The firm has a manufacturing legacy in Hamburg that dates back over a century to the founding of the Valvo radio tube factory in 1924 — a pioneering site in German electronics history. Now, Nexperia's Hamburg facility produces about 25% of the world's small-signal diodes and transistors. Since 2017, the site has expanded from 950 to about 1600 staff and undergone significant technological modernization, including a strategic expansion into power semiconductors.

"This is Nexperia's first endowed professorship and a milestone for our engagement with research and education," Thorns says. "We're proud to partner with TU Hamburg — a strong academic institution — to shape the future of energy-efficient semiconductor technologies in Germany and beyond."

Beginning in the winter semester 2025/26, Kapels will teach 'Electrical Engineering I' and 'Wide Bandgap Semiconductors', helping to equip a new generation of engineers with the expertise needed to support the global shift toward electrification and decarbonization.

www.nexperia.com
www.tuhh.de/ped/en/homepage

Nexperia adds 1200V 20A SiC Schottky diodes

Nexperia has added two 1200V 20A SiC Schottky diodes to its portfolio of power electronics components.

The PSC20120J and PSC20120L have been designed to address the demand for ultra-low power loss rectifiers, which enable high-efficiency energy conversion in industrial applications. As such, they are suitable for the power supply units (PSUs) in power-intensive artificial intelligence (AI) server infrastructure, telecoms equipment and solar inverter applications.

The new Schottky diodes feature temperature-independent capacitive switching and zero recovery behavior that delivers what is claimed to be an outstanding figure-of-merit ($Q_C \times V_F$). Further, they exhibit switching performance that is almost entirely independent of variations in current and switching speed.

The merged PiN Schottky (MPS) structure of the devices provides added benefits, such as outstanding robustness against surge currents, as evidenced by their high peak forward current (IFSM). This feature mitigates the requirement for extra protection circuitry, significantly reducing system complexity and enabling engineers to achieve higher efficiency using smaller form factors in rugged high-voltage applications.

The PSC20120J is encapsulated in a Real-2-Pin D2PAK R2P (TO-263-2) surface-mount device (SMD) power plastic package. The PSC20120L is housed in a Real-2-Pin TO247 R2P (TO-247-2) through-hole power plastic package. These thermally stable packages are said to enhance device reliability in high-voltage applications at operating temperatures up to 175°C.

www.nexperia.com/sic-diodes

Infineon on track to ship customer samples of GaN on 300mm wafers in Q4/2025

More than 40 new GaN products launched in past year

Infineon Technologies AG of Munich, Germany says that its scalable gallium nitride (GaN) manufacturing on 300mm wafers is on track for first samples to be available to customers as of fourth-quarter 2025, positioning it to expand its customer base and reinforce its position as a leading integrated device manufacturer (IDM) in the GaN market as demand continues to grow.

The GaN market for power applications will grow by 36% annually to about $2.5bn by 2030, forecasts Yole Group in its report 'Power SiC and GaN Compound Semiconductor Market Monitor, Q1 2025'.

Infineon's capabilities span all three relevant materials: silicon (Si), silicon carbide (SiC) and gallium nitride. With higher power density, faster switching speeds, and lower power losses, GaN enables smaller designs, reducing energy consumption and heat generation in electronic devices like smartphone chargers, industrial and humanoid robots or solar inverters.

"Our fully scaled-up 300mm GaN manufacturing will allow us to deliver highest value to our customers even faster while moving towards cost parity for comparable silicon and GaN products," says Johannes Schoiswohl, head of Infineon's GaN business line. "Almost a year after the announcement of Infineon's breakthrough in 300mm GaN wafer technology, we are pleased that our transition process is well on track and that the industry has recognized the importance of Infineon's GaN technology enabled by the strength of our IDM strategy."

Infineon's manufacturing strategy primarily relies on an IDM model — owning the entire semiconductor production process, from design to manufacturing and selling the final product. Its in-house manufacturing strategy is reckoned to be a key differentiator in the market, providing advantages such as high quality, faster time-to-market as well as superior design and development flexibility. Infineon has launched more than 40 new GaN products in the past year. Infineon says that it is committed to supporting its GaN customers and can scale capacity to meet their needs for reliable GaN power solutions.

Infineon has become the first semiconductor manufacturer to develop 300mm GaN power wafer technology within its existing high-volume manufacturing infrastructure.

Infineon claims to have become the first semiconductor manufacturer to develop 300mm GaN power wafer technology within its existing high-volume manufacturing infrastructure. Chip production on 300mm wafers is technically more advanced and significantly more efficient compared with established 200mm wafers

Building on its technology, Infineon claims to have become the first semiconductor manufacturer to develop 300mm GaN power wafer technology within its existing high-volume manufacturing infrastructure. Chip production on 300mm wafers is technically more advanced and significantly more efficient compared with established 200mm wafers, as the larger wafer diameter allows 2.3 times more chips to be produced per wafer. These increased capabilities — combined with Infineon's large team of GaN experts and what is claimed to be industry's broadest IP portfolio — are needed as GaN power semiconductors are being rapidly adopted in industrial, automotive, consumer and computing & communication applications, such as power supplies for AI systems, solar inverters, chargers and adapters or motor control systems.

www.infineon.com/gan

Infineon adds rad-hard GaN HEMTs

First in-house-manufactured GaN transistor

Infineon Technologies AG of Munich, Germany has announced the first of a new family of radiation-hardened gallium nitride (GaN) transistors, fabricated at its own foundry, based on its proven CoolGan technology. Designed to operate in harsh space environments, the new product is the first in-house-manufactured GaN transistor to earn the highest quality certification of reliability assigned by the US Defense Logistics Agency (DLA) to the Joint Army Navy Space (JANS) Specification MIL-PRF-19500/794.

The new rad-hard GaN high-electron-mobility transistor (HEMT) devices are engineered for mission-critical applications required in on-orbit space vehicles, manned space exploration, and deep space probes. Combining the robust performance of GaN HEMTs with Infineon 50+ years of experience in high-reliability applications, the new power transistors are said to deliver best-in-class efficiency, thermal management and power density for smaller, lighter and more reliable space designs.

The devices complement Infineon's proven legacy radiation-hardened silicon MOSFET portfolio, providing access to a full catalog of power solutions for space applications.

"The Infineon team continues to push the limits of power design with our new GaN transistor line," says Chris Opoczynski, senior VP & general manager HiRel, at Infineon. "This milestone brings the next generation of high-reliability power solutions for mission-critical defense and space applications that utilize the superior material properties of wide-bandgap semiconductors to customers serving the growing aerospace market."

The first three product variations in the new rad-hard GaN transistor line are 100V, 52A devices featuring what is claimed to be an industry-leading ($R_{DS(on)}$ (drain–source on resistance) of 4mΩ (typical) and total gate charge (Q_g) of 8.8nC (typical). Encased in robust hermetically sealed ceramic surface-mount packages, the transistors are single-event effect (SEE) hardened up to LET (GaN) = 70MeV.cm^2/mg (Au ion).

The rad hard GaN transistors are engineered for mission-critical applications required in on-orbit space vehicles, manned space exploration, and deep space probes.

Two devices, which are not JANS certified, are screened to a total ionizing dose (TID) of 100krad and 500krad. The third device, screened to 500krad TID, is qualified to the rigorous JANS Specification MIL-PRF-19500/794.

Infineon claims to be the first company to achieve the DLA JANS certification for fully internally manufactured GaN power devices. DLA JANS certification requires rigorous levels of screening and Quality of Service Class Identifiers to ensure the performance, quality and reliability required for space flight applications.

Infineon is also running multiple lots prior to full JANS production release to ensure long-term manufacturing reliability.

Engineering samples and evaluation boards are available now, with the final JANS device released in summer 2025. Additional JANS parts are launching soon, expanding available voltages and currents to enable greater flexibility in creating efficient and reliable designs.

www.infineon.com/radhardgan

US-based GlobalFoundries investing extra $3bn for R&D on silicon photonics, advanced packaging & GaN

Total raised to $16bn, following $13bn announced last November to reshore chip manufacturing and accelerate AI growth

GlobalFoundries of Malta, NY, (GF, the only US-based pure-play foundry with a global manufacturing footprint including facilities in the USA, Europe and Singapore) plans to invest another $3bn in its expansion of semiconductor manufacturing and advanced packaging capabilities across its facilities in New York and Vermont.

This brings the total to $16bn, after it announced last November that it was investing $13bn over the next 10-plus years across its two US sites, aided by $1.5bn in direct funding through the US CHIPS and Science Act (proposed in February 2024 and confirmed in November) plus more than $550m in support from the New York State Green CHIPS Program, as well as funding and support from Vermont, GF ecosystem partners and key strategic customers, and other incentives.

The investments support three projects:

- Expansion of GF's existing fabrication plant in Malta, NY, by adding critical technologies already in production at GF's Singapore and Germany facilities, to enable a secure and reliable supply of domestically manufactured essential chips for the US auto industry.
- Modernization and upgrading of GF's existing fab in Essex Junction, Vermont, to expand production capacity and create a facility capable of high-volume manufacturing of gallium nitride on silicon (GaN-on-Si) semiconductors on 200mm-diameter wafers, for use in electric vehicles, data centers, IoT, smartphones and other critical applications.
- In alignment with market conditions and customer demand, construction of a new fab on GF's campus in Malta, NY (leveraging the site's existing infrastructure and ecosystem, enabling rapid and efficient construction), in order to meet expected demand for US-made essential chips across a broad range of markets and applications including automotive, artificial intelligence (AI) in the data center and at the edge, as well as aerospace & defense.

Combined, these projects are expected to create nearly 1000 direct manufacturing jobs and more than 9000 construction jobs. The two New York-based projects are expected to triple the existing capacity of GF's Malta campus, in alignment with expected market requirements and customer demand.

GF says that its investment is a strategic response to the explosive growth in AI, which is accelerating demand for next-generation semiconductors designed for power efficiency and high-bandwidth performance across data centers, communications infrastructure and AI-enabled devices.

GF is collaborating with major technology companies such as Apple, SpaceX, AMD, Qualcomm Technologies Inc, NXP and GM, that are "committed to reshoring semiconductor production to the USA and diversifying their global supply chains". These companies are partnering with GF to support their production of US-made chips, underscoring GF's role as a trusted supplier of essential semiconductors and a key enabler of supply chain security, the firm adds.

GF's investment is a strategic response to the explosive growth in AI, which is accelerating demand for next-generation semiconductors designed for power efficiency and high-bandwidth

"The AI revolution is driving strong, durable demand for GF's technologies that enable tomorrow's data centers – including GF's leading silicon photonics, as well as GaN for power applications," says GlobalFoundries' CEO Tim Breen. "Meanwhile at the edge, GF's proprietary FDX technology is uniquely positioned to support AI functionality with low power consumption," he adds.

"GlobalFoundries investment is a great example of the return of United States manufacturing for critical semiconductors," comments US Secretary of Commerce Howard Lutnick. "President Trump has made it a fundamental objective to bring semiconductor manufacturing home to America. Our partnership with GlobalFoundries will secure US semiconductor foundry capacity and technology capabilities for future generations."

The rapid rise of AI in both the cloud and at the edge is driving the adoption of new technology platforms and 3D heterogeneous integration technologies. These solutions are essential to meet the exponentially growing requirements for power efficiency, bandwidth density and performance. GF reckons that it is uniquely positioned to lead in this space, with its 22FDX and silicon photonics capabilities in production in New York and development of differentiated GaN-based power solutions in Vermont.

GF's investment builds on its existing US expansion plans, including more than $13bn to expand and modernize its New York and Vermont facilities and funding for its recently launched New York Advanced Packaging and Photonics

Center — the first US-based facility of its kind dedicated to silicon photonics packaging. The additional $3bn includes advanced R&D initiatives focused on packaging innovation, silicon photonics and next-generation GaN technologies. The total $16bn plan aims to accelerate innovation in AI, aerospace, automotive and high-performance communications.

"GlobalFoundries has supplied semiconductors for Apple products since 2010 and we're excited to see them expand right here in the United States," comments Apple's CEO Tim Cook. "These chips are an essential part of Apple products like iPhone," he adds.

"Advanced semiconductors are critical to the advanced satellite capabilities which SpaceX has been pioneering for over two decades," says SpaceX's president & COO Gwynne Shotwell. GlobalFoundries' expansion of its manufacturing base in the USA is "core to Starlink's growth and our commitment to manufacturing in the US, as well as our mission to deliver high-speed internet access to millions of people around the world," she adds.

The additional $3bn includes advanced R&D initiatives focused on packaging innovation, silicon photonics and next-generation GaN technologies.

"As a strategic supplier of Qualcomm, GlobalFoundries shares our vision for strengthening US chip production capacity," notes Qualcomm's president & CEO Cristiano Amon. "This commitment from GlobalFoundries will help secure a resilient semiconductor supply chain to support the next wave of US technology innovation, especially in areas vital to enabling power-efficient computing, connectivity, and edge intelligence," he adds.

"Deepening our partnership with GlobalFoundries aligns with NXP's hybrid manufacturing strategy, where we work with leading foundry partners to better serve our customers' strategic technology, capacity and resilience needs," notes NXP's CEO Kurt Sievers. "This collaboration allows us to scale efficiently, expand production in the US and continue delivering for our customers. It's a strong step forward in building a resilient, high-performing semiconductor supply chain in the United States," he adds.

"Semiconductors are critical to the future of vehicles, and their importance will only grow," says GM's president Mark Reuss. "GlobalFoundries' investment supports our work to secure a reliable, US-based chip supply — essential for delivering the safety, infotainment and features our customers expect."

www.gf.com

Vermont Tech Hub's semiconductor lab awarded $3.4m from Northeast Microelectronics Coalition

New test and characterization facility to open to tech businesses and innovators in early 2026

The Vermont Gallium Nitride (V-GaN) Tech Hub — a consortium founded in 2023 with over 60 member and partners and led by the University of Vermont (UVM) and including GlobalFoundries and the State of Vermont — has secured $3.4m of funding from the Northeast Microelectronics Coalition (NEMC) for a microelectronics testing laboratory to bolster innovation and economic development in the Green Mountain State and the Northeast.

"This will be the first publicly accessible lab in the nation that offers comprehensive testing and technical advice for high-power and high-frequency GaN and wide-bandgap devices," notes UVM's regional innovation officer Douglas Merrill.

The V-GaN Test and Characterization Lab will provide NEMC and V-GaN member businesses and researchers with advanced testing services for high-power and high-frequency devices, such as semiconductor chips used in motor controllers, power inverters, voltage regulators, battery chargers, and amplifiers and switches for 5G/6G devices and radar applications.

This will be the first publicly accessible lab in the nation that offers comprehensive testing and technical advice for high-power and high-frequency GaN and wide-bandgap devices

Expected to open in January 2026, the South Burlington facility will be operated by the University of Vermont and housed within the OnLogic headquarters building in Technology Park. The NEMC funding will support the infrastructure build-out and operating expenses for the facility. UVM will provide management and back-office support to the laboratory.

"Our investment in this lab isn't just about infrastructure — it's about enabling scientists and engineers to turn bold ideas into game-changing technologies," says NEMC's director Mark Halfman. "This facility represents our commitment to bridging the gap between groundbreaking research and real-world impact."

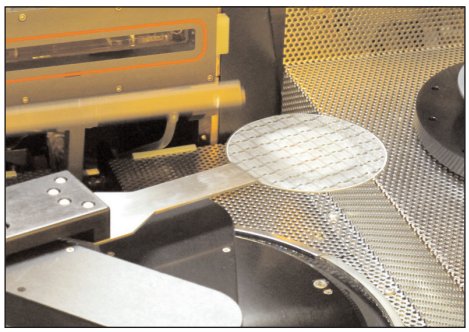
www.vgan.tech
https://nemicroelectronics.org

Linearity optimized 0.12µm GaN power process from WIN

NP12-1B technology provides 28V operation for high-power applications across K-band to V-band

WIN Semiconductors Corp of Taoyuan City, Taiwan — which provides pure-play gallium arsenide (GaAs) and gallium nitride (GaN) wafer foundry services for the wireless, infrastructure and networking markets — has launched NP12-1B, a 0.12µm gate-length depletion-mode (D-mode) GaN high-electron-mobility transistor (HEMT) technology on silicon carbide (SiC) substrates. Engineered for demanding high-power applications across K-band to V-band frequencies, NP12-1B delivers what is claimed to be industry-leading high-power front-end solutions with exceptional linearity, ruggedness and reliability for next-generation RF and microwave systems.

For high-linearity amplifiers, NP12-1B is designed to meet the rigorous requirements for high-power RF applications including high-power microwave and



millimeter-wave communication systems, radar systems (including airborne, shipborne, and ground-based), electronic warfare and avionics, wireless infrastructure, ultra-wideband and broadband systems, and test & measurement equipment. The demand for high linearity to minimize signal distortion and intermodulation is critical for maintaining signal integrity in densely packed spectral environments.

NP12-1B incorporates multiple transistor improvements, providing a combination of high breakdown voltage, enhanced linearity, and robust operation in continuous wave (CW) high-compression scenarios. The technology's source-coupled field-plate design ensures a typical gate-to-drain breakdown voltage of 120V, supporting high power density and system reliability. NP12-1B is available with the Enhanced Moisture Ruggedness option, which provides excellent humidity resistance for use in plastic packaging.

NP12-1B is supported by a complete process design kit featuring both large-signal and small-signal models, expediting the development of high-performance RF circuits. A comprehensive qualification report is available upon request.

The NP12-1B will be available for high-volume production in third-quarter 2025.

www.winfoundry.com
www.ims-ieee.org

Power Integrations names Jennifer Lloyd as CEO

Power Integrations Inc of San Jose, CA, USA (which provides high-voltage integrated circuits for energy-efficient power conversion) says that Jennifer A. Lloyd PhD will be its next chief executive officer, succeeding Balu Balakrishnan, who has been CEO since 2002. A former member of Power Integrations' board of directors, Lloyd has been reappointed to the board. Both appointments are effective from 21 July.

Since 1997, Lloyd has served in increasingly senior engineering and business roles at Analog Devices Inc. She has led multiple $1bn+ businesses spanning various technologies and end markets. Most recently, she was corporate VP leading its multi-market power business unit, responsible for product, strategy and profit & loss, with leadership of a large global team. Prior roles included leadership of Analog's precision franchise and its healthcare and consumer unit.

"Throughout her distinguished career at Analog Devices, she has proven her ability to drive innovation, deliver new products to the market and achieve profitable growth," comments Balakrishnan about Lloyd. "Her deep knowledge of power products and technologies and her familiarity with our company will allow her to hit the ground running," he adds.

Lloyd holds doctoral, master's and bachelor's degrees in electrical engineering and computer science from the Massachusetts Institute of Technology. As an author of numerous technical papers and recipient of eight US patents, she has also been active in the IEEE community, having served on the technical program committee for the International Solid-State Circuits Conference (ISSCC), the Custom Integrated Circuits Conference (CICC) and the VLSI Symposia.

Balakrishnan will serve as executive chairman of Power Integrations' board of directors for six months to aid the leadership transition. He is expected to remain a non-executive member of the board thereafter. Bala Iyer will remain in the role of lead independent director.

"Power Integrations has a unique franchise in high-voltage semiconductors, with strong intellectual property spanning process, design and packaging, as well as strong system-level expertise and a brand that is respected across the power electronics industry," says Lloyd. "The company has tremendous growth opportunities in markets like automotive, data center, renewable energy, grid modernization etc."

www.power.com

TSMC to end GaN foundry production by end-July 2027 due to price pressure from Chinese rivals

Hsinchu Fab 5 being repurposed for advanced packaging, driven by AI

When gallium nitride (GaN) power IC and silicon carbide (SiC) technology firm Navitas Semiconductor Corp of Torrance, CA, USA announced a strategic partnership for Taiwanese foundry Powerchip Semiconductor Manufacturing Corp (PSMC) to start production of 100V GaN products on 200mm silicon wafers in first-half 2026, this includes Navitas' 650V devices transitioning from its existing sole GaN-on-Si wafer foundry supplier Taiwan Semiconductor Manufacturing Company Ltd (TSMC) to Powerchip over the next 12–24 months.

According to a Form 8-K filing by Navitas to the US Securities and Exchange Commission (SEC), this follows being informed by TSMC that it will end GaN wafer foundry production by end-July 2027.

Navitas adds that it is engaged in identifying and qualifying additional potential suppliers in order to diversify its supply chain and enhance operational flexibility.

According to Taiwan-based market analyst firm TrendForce, TSMC is focusing on advanced-node silicon development for booming AI applications, and pulling back from legacy businesses.

Specifically, TSMC is repurposing its Hsinchu Fab 5 (which is used for GaN) for advanced packaging. By reusing existing cleanroom facilities, TSMC reckons that it can accelerate expansion with minimal effort, as demand surges for chip-on-wafer-on-substrate (CoWoS), wafer-on-wafer (WoW), and wafer-level system integration (WLSI) technologies.

Taiwanese financial newspaper Commercial Times highlights rising price pressure from Chinese rivals as a key driver behind TSMC opting for a strategic exit from GaN, given the limited scale and low profitability of GaN production.

According to financial services firm Anue, TSMC's 6-inch monthly output for GaN is 3000–4000 wafers, with Navitas comprising over half of that and Ancora Semi a major customer.

www.tsmc.com

ETRI–Wavice project localizes core GaN components for AESA radar and SAR satellite

South Korean project targets self-reliance in GaN transmit/receive chips previously dependent on imports

In collaboration with Gyeonggi-based Wavice Inc, South Korea's Electronics and Telecommunications Research Institute (ETRI) has developed localization technology for gallium nitride (GaN) monolithic microwave integrated circuits (MMICs) used in transmit/receive modules for military radars and satellites for the first time in Korea using fab-based technology. This is expected to significantly contribute to defense technology self-reliance by enabling the localization of key components not only for military radars but also for high-resolution synthetic aperture radar (SAR) systems.

Previously fully dependent on imports, these high-performance military semiconductor components have now been developed with domestic technology, and a foundation has been established for mass production at local facilities. The results are expected to bolster national defense autonomy and provide a strong response to export regulations.

The research was promoted as part of the National Research Council of Science & Technology's (NST) Creative Allied Project beginning in 2023. Through the integration of ETRI's semiconductor design technology and Wavice's manufacturing process expertise, three key types of X-band transmit/receive chips were developed: power amplifier (PA), low-noise amplifier (LNA), and switch (SW) MMICs.

These components are claimed to demonstrate performance on a par with commercial products from leading foundry nations such as the USA and Europe, and are the first results utilizing Korea's only GaN mass-production fab facilities.

Compared to conventional gallium arsenide (GaAs)-based products, the developed GaN MMICs offer higher output and efficiency, which is expected to dramatically improve the performance of military and satellite communication, especially active electronically scanned array (AESA) radars.

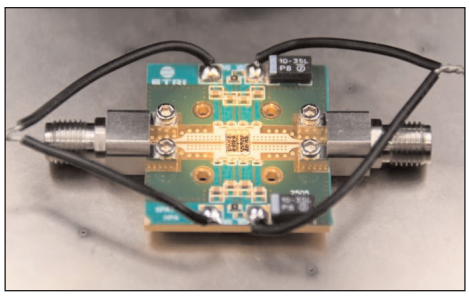


Photo courtesy of Electronics and Telecommunications Research Institute (ETRI).

AESA radar technology is capable of electronically steering beams to rapidly detect and track targets. It comprises an antenna with multiple transmit/receive modules. Each module integrates a power amplifier to boost transmission signals, a low-noise amplifier to receive signals cleanly, and a switch to toggle between transmit and receive modes.

SAR systems also adopt similar transmit/receive module architectures. GaN semiconductors, with their high power and efficiency, greatly contribute to miniaturization and performance enhancement of such devices.

The components developed in this research are therefore expected to significantly improve the performance of X-band military, maritime and satellite communication radars in South Korea and aid in achieving technological self-reliance.

Since 2020, ETRI has accumulated foundational research results on GaN technology through its DMC Convergence Research Department. The recent achievement is a follow-up effort conducted in collaboration with Wavice to link it with domestic mass-production capabilities.

"By combining ETRI's design technology with Wavice's processing technology, we developed three types of high-performance T/R chips for the first time in Korea," notes Dr Jong-Won Lim of ETRI's RF/Power Components Research Section. "We hope this technology contributes to the localization of radar and satellite components," he adds.

"With the domestic infrastructure capable of mass-producing GaN semiconductors, we have laid the foundation for the self-reliance of critical defense components," says Wavice's chief technology officer Yun-Ho Choi. "This will greatly support the stable development of such systems."

The research team plans to accelerate the localization of military semiconductor components that have long depended on foreign products. They have completed the transfer of design technology to Wavice and are preparing for full-scale commercialization.

They have localized GaN-based MMICs for AESA radar T/R modules, including power amplifiers, low-noise amplifiers, and switches, and even developed a single-chip MMIC integrating all these functions.

This research result builds on ETRI's prior work and advances the technological maturity of GaN technology for defense applications using Wavice's foundry capabilities.

The achievement is part of the NST project 'Advanced Technology Development and Mass Production for Semiconductor Components in Defense for AESA Radar and SAR Satellites using Domestic Foundry'.

www.wavice.com
www.etri.re.kr/eng/main/main.etri

Mouser enters distribution agreement with Ampleon

GaN and LDMOS RF power devices to be distributed globally

Mouser Electronics Inc (a Berkshire Hathaway company) has announced a global distribution agreement with Ampleon B.V. of Nijmegen, The Netherlands, which manufactures radio frequency power devices based on gallium nitride (GaN) and LDMOS technologies. Ampleon says that its portfolio offers flexibility in scaling design and production for any volume and addresses a wide range of applications, including 5G infrastructure, industrial, scientific & medical (ISM), navigation, broadcast communications, and safety radio.

Ampleon's ART1K6FH and ART2K0FE LDMOS RF power transistors, available from Mouser, are based on Advanced Rugged Technology (ART). The ART series' novel silicon LDMOS nodes are engineered for a high drain–source breakdown while maintaining a low output capacitance, enabling rugged transistors with high transconductance in the frequency range from HF through UHF.

The 1600W ART1K6FH power transistors offer a 1–425MHz frequency range, and the unmatched 2000W ART2K0FE power transistors offer a 1–400MHz frequency range. These devices provide coverage for various ISM, broadcast and communications applications, delivering high efficiency and excellent thermal stability/ruggedness with no device degradation. Both devices are offered in SOT539AN, SOT539BN and SOT1248C air-cavity ceramic packages.

The BLF981 and BLF981S LDMOS power transistors are designed for broadcast, industrial, avionics, non-cellular and ISM communications applications. Their ruggedness suits digital and analog transmitter applications in the frequency range from HF to 1400MHz. The BLF981 is housed in an SOT467C package, while the BLF981S comes in an SOT467B package, both supporting robust thermal management and long-term reliability.

The CLP24H4S30P GaN–SiC HEMT is a high-efficiency 30W power transistor designed for continuous wave (CW) applications in the 2400–2500MHz frequency range. Suitable for use in industrial, scientific, medical and consumer cooking systems, the CLP24H4S30P offers what is claimed to be excellent power performance and thermal stability. Housed in a compact 7mm x 7mm DFN surface-mount package, the CLP24H4S30P is suitable for compact, high-power RF amplifier designs.

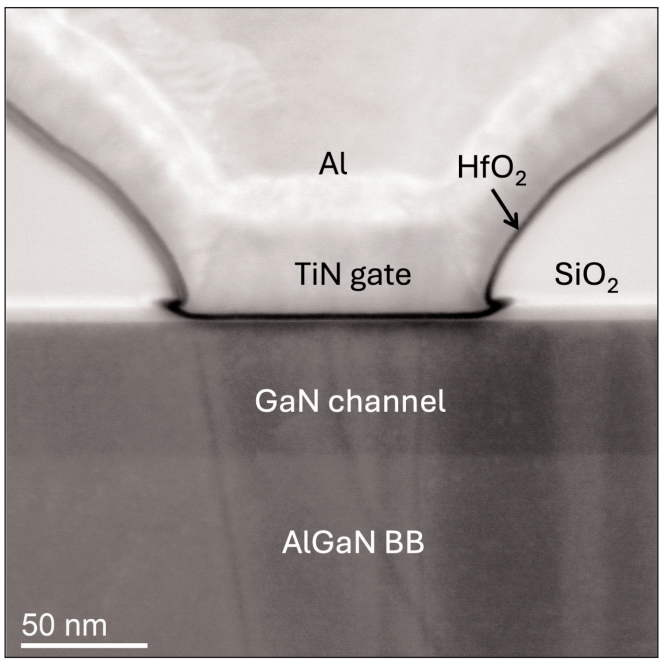
www.mouser.com
www.ampleon.com

Imec demonstrates record RF GaN-on-silicon transistor performance

Record-breaking performance marks a crucial step in integrating GaN technology into next-generation mobile devices

Imec of Leuven, Belgium has unveiled a gallium nitride (GaN) MOSHEMT (metal-oxide-semiconductor high-electron-mobility transistor) on silicon (Si) that achieves both record efficiency and output power for an enhancement-mode (E-mode) device operating at low supply voltage. In parallel, the firm also demonstrated a record-low contact resistance of 0.024Ω·mm, which is essential to further boost output power in future designs. Imec says that the results mark a crucial step toward integrating GaN technology into next-gen mobile devices, particularly those targeting the 6G FR3 band between 7GHz and 24GHz. The results were presented at the 2025 Symposium on VLSI Technology and Circuits in Kyoto, Japan (8–12 June).

Imec's GaN-on-Si E-mode MOSHEMT achieved a record 27.8dBm (1W/mm) output power and 66% power-added efficiency (PAE) at 13GHz and 5V. The result was obtained in a single device with an 8-finger gate layout, providing the gate width needed for high output power without requiring the combined power of multiple transistors. Imec says that the performance was enabled by combining a gate recess technique, used to shift the device into E-mode, with an InAlN barrier layer that offsets the performance loss from the thinned channel.



Cross-sectional TEM image of the gate structure in imec's GaN-on-silicon transistor, showing the finely etched gate region that enables the device's E-mode operation.

In parallel to the device development, imec demonstrated a record-low contact resistance of 0.024Ω·mm, using a regrown n^+(In)GaN layer maximizing current flow and minimizing power loss. While the result was obtained in a separate module, it is fully compatible with the E-mode transistor architecture. Simulations indicate that integrating this contact module could improve the output power density by 70%, meeting the performance target for 6G user equipment.

"Reducing contact resistance is crucial for pushing output power while keeping efficiency high," said Alireza Alian, principal member of technical staff at imec. "Our next step is to integrate this contact module into the E-mode transistor and validate the expected gains in power and efficiency, bringing the device closer to real-world 6G applications."

www.imec-int.com

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Mitsubishi Electric unveils compact GaN power amplifier module with record-breaking power efficiency

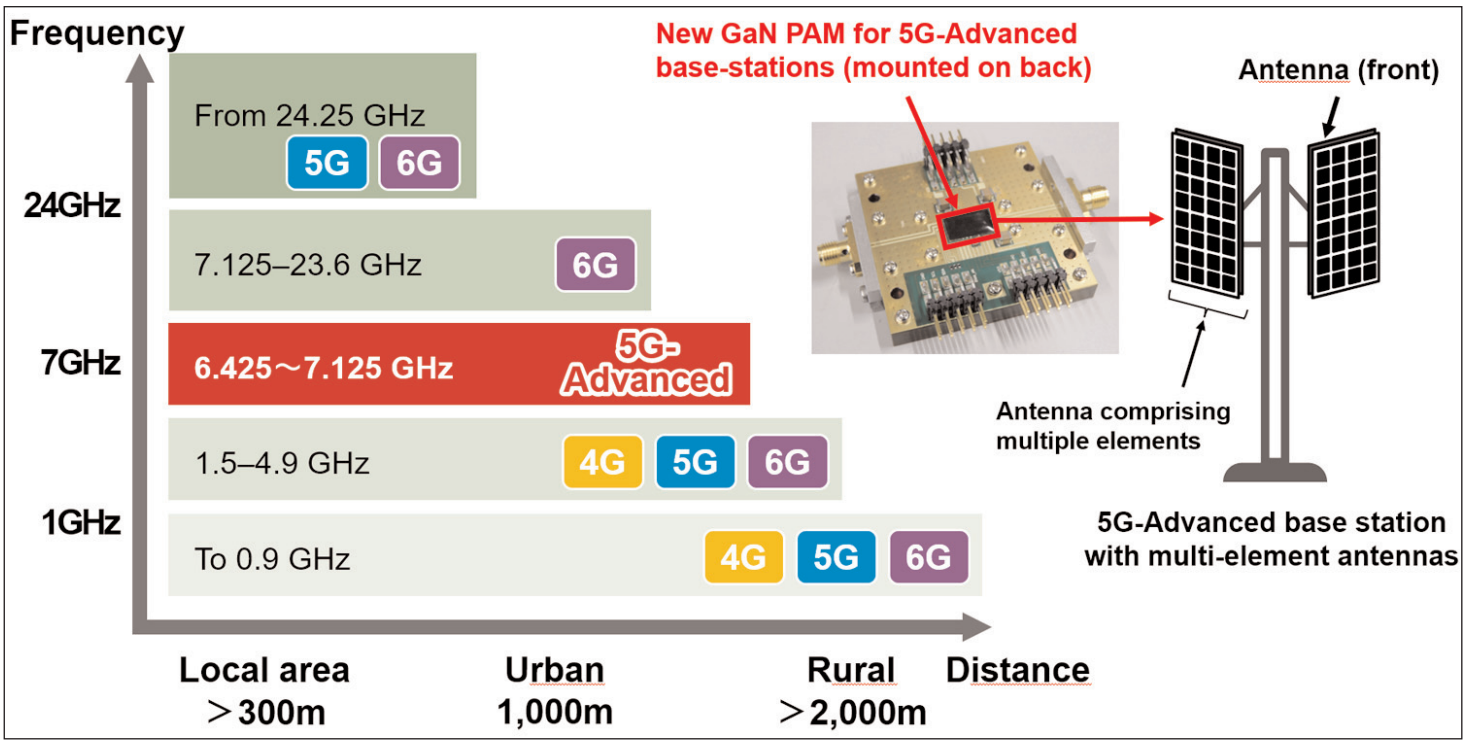
Tokyo-based Mitsubishi Electric Corporation says it has developed a compact 7GHz band gallium nitride (GaN) power amplifier module (PAM) with record-breaking power efficiency of 41%. The performance was verified in a demonstration using 5G-Advanced communication signals.

According to the firm, the new PAM will make installation easier and enhance the power efficiency of 5G-Advanced base stations, thereby supporting the transition to 6G.

The PAM was developed using proprietary matching-circuit technology and high-performance GaN transistors. Thanks to high-density component mounting, the prototype module measures just 12.0mm x 8.0mm.

Technical details were presented at the IEEE International Microwave Symposium 2025 in San Francisco, CA, USA. (15–20 June) In addition, a joint live demonstration with Wupatec was conducted at the event's exhibition venue.

www.mitsubishielectric.com



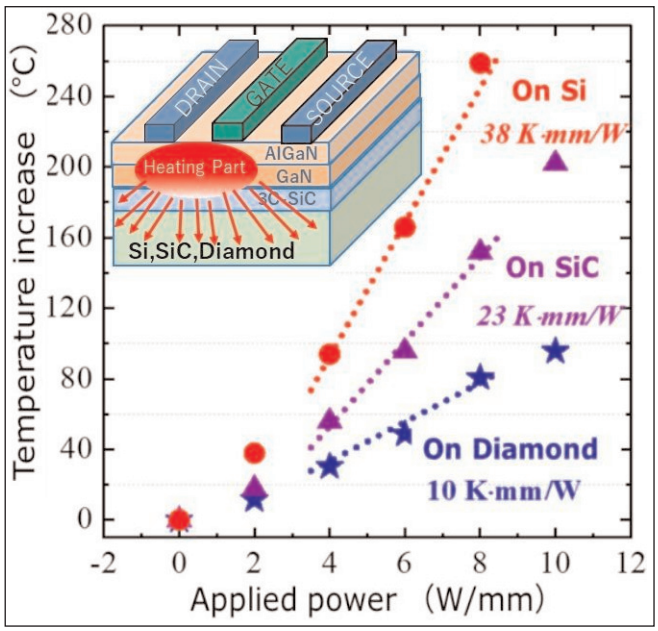
Sumitomo Electric and Osaka Metropolitan fabricate GaN HEMT on 2-inch polycrystalline diamond

Japan's Sumitomo Electric Industries (SEI) and Osaka Metropolitan University (OMU) have fabricated a gallium nitride high-electron mobility transistor (GaN HEMT) on a 2-inch polycrystalline diamond (PCD) substrate in a joint research project with the Japan Science and Technology Agency (JST). The technology is reckoned to be an important step toward achieving higher capacity and lower power consumption of core devices in mobile and satellite communications.

In recent years, as the volume of information in wireless communications has increased, there has been a demand for higher frequencies and higher output powers in high-frequency devices such as GaN HEMTs. However, the self-heating that occurs during operation limits the devices' output power, resulting in signal transmission failures and other problems that reduce the performance and reliability of communications. To address these issues, OMU has improved the heat dissipation characteristics by using diamond (which has extremely high thermal conductivity) as a substrate for GaN HEMTs.

Generally, silicon and silicon carbide (SiC) are used as substrates for GaN HEMTs, but the thermal conductivity of diamond is about 12 times higher than that of silicon and 4–6 times higher than that of SiC. So, using diamond as a substrate can reduce thermal resistance by a quarter and half, respectively.

Previously, direct bonding to GaN layers without solder or bonding material was difficult due to the large grain size and poor surface roughness (5–6nm) of polycrystalline diamond. However, Sumitomo Electric has succeeded in directly bonding a GaN layer to a 2-inch polycrystalline diamond substrate by leveraging its diamond substrate polishing technology to reduce the surface roughness to halve the conventional level and by integrating OMU's technology to transfer the GaN layer from the silicon substrate onto the polycrystalline diamond. Consequently, the researchers have demonstrated GaN structure on polycrystalline diamond with uniform heat dissipation characteristics. The GaN layer used in this study was provided by Air Water Inc as a GaN/SiC epitaxial layer on a silicon substrate.



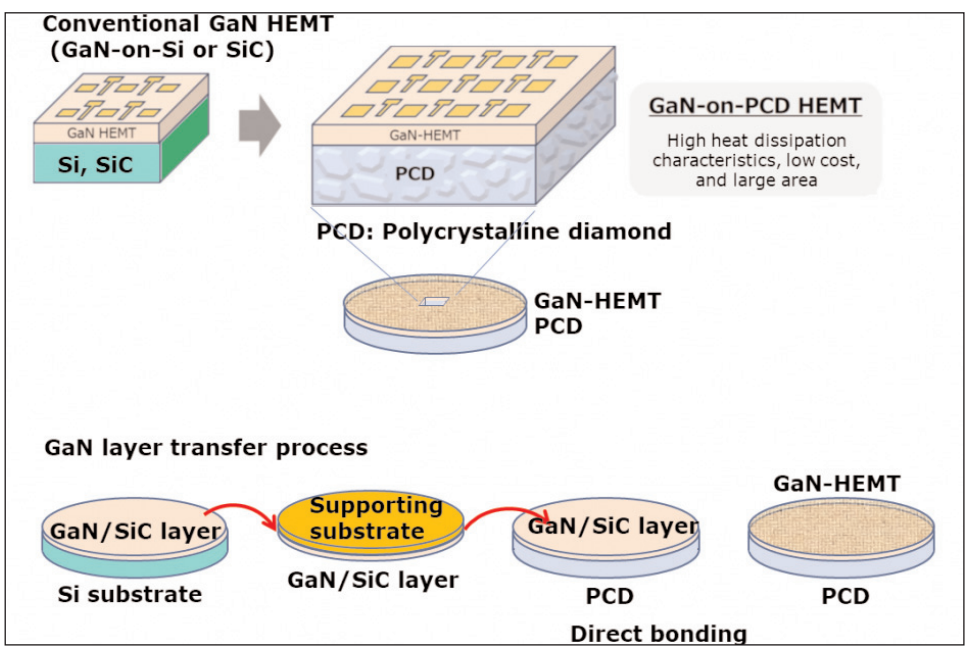
Heat dissipation of GaN HEMTs made on silicon, SiC, and diamond (a smaller rise in temperature for the same applied power equals better heat dissipation).

OMU contributed the technology for transferring GaN/SiC epitaxial layers grown on silicon substrates onto diamond substrates in order to fabricate the GaN HEMT devices. Sumitomo Electric contributed manufacturing and polishing technologies for large polycrystalline diamond substrates that have been used in heat dissipation materials and tool products such as heat sinks and bonding tools.

In the future, the team aims to develop the device performance and to optimize the bonding conditions using 4-inch substrates aimed at mass production, while accelerating the process.

The work is supported by Adaptable and Seamless Technology transfer Program through Target-driven R&D (A-STEP) from the Japan Science and Technology Agency (JST), Japan grant number JPMJTR222B.

www.omu.ac.jp/en
www.sedi.co.jp



MACOM makes available wideband front-end module covering 2–18GHz

Multi-chip transmit/receive module suitable for electronic countermeasures and phased-array radar applications

MACOM Technology Solutions Inc of Lowell, MA, USA has announced the availability of a wideband front-end module (FEM) covering 2–18GHz. Suitable for electronic countermeasures (ECM) and phased-array radar applications, the miniature multi-chip ENGSD00088 transmit/receive module integrates a high-power 3-stage gallium nitride (GaN) power amplifier (PA), a 3-stage gallium arsenide (GaAs) low-noise amplifier (LNA) and a transmit/receive (T/R) switch with a fail-safe antenna termination, all within a compact package.

The transmit path delivers 2.5W typical saturated output power with power-added efficiency (PAE) of 24%, along with 25dB of large-signal gain. The receive side provides 27dB of gain with a low noise figure of 3.5dB and 26dBm output third-order intercept point (OIP3). The receive channel can handle input powers up to +20dBm with an option to add a limiter for additional protection input power handling.

Suitable for wideband phased-array architectures, the ENGSD00088 offers high gain in both transmit and receive modes, minimizes board space and simplifies system design, while its high performance allows mission-critical reliability. The FEM were on display at the IEEE MTT-S International Microwave Symposium (IMS 2025) in Moscone Center, San Francisco, CA, USA (17–19 June).

www.ims-ieee.org
www.macom.com/products/

MACOM showcases advanced RF and microwave solutions at IMS 2025

Firm also presents GaN and GaAs foundry services

At the IEEE MTT-S International Microwave Symposium (IMS 2025) in Moscone Center, San Francisco, CA, USA (15–20 June), MACOM Technology Solutions Inc of Lowell, MA, USA showcased its portfolio of high-performance RF, microwave and millimeter-wave (mmWave) solutions and foundry services, with technical experts available to highlight performance advantages, plus a full lineup of technical presentations throughout the show.

MACOM featured 16 hands-on technology demonstrations showcasing real-time performance and results, including many of its new products for electronic warfare (EW), radar and SATCOM applications. Demonstrations include a high-performance wideband low-noise amplifier (LNA) and power amplifier (PA); X-band PA pallet and front end module; C-band linearizers and PAs; Q-band linearizer; Ka- and Ku-band PAs; E-band upconverter and LNA; 2–18GHz solutions including an integrated switched filter bank; a transmit/receive module (TRM) and time delay unit (TDU); switches and limiters as well as a display of a wide variety of RF, microwave and mmWave products.

MACOM also presented its Foundry Services, highlighting its expertise in gallium nitride (GaN) and gallium arsenide (GaAs) process technologies. The foundry capabilities support the entire product development lifecycle — from design assistance and scalable device models to production-ready processes and quality testing. At IMS 2025, MACOM's foundry team was available to discuss how its services can help customers move from initial development through high-volume manufacturing with proven high first-pass design success and process reliability.

Technical program participation

MACOM was selected by IEEE MTT-S to present several technical sessions during IMS 2025, covering topics such as GaN PA waveform engineering, high-efficiency PAs for 6G and MIMO applications, X-band MMIC designs and Ka-band LNA innovations. These included:

- 'WSJ-3: Understanding the Harmonic Balance Simulation Technique for Use in the Waveform Engineering of Advanced GaN Power Amplifiers';
- 'WMA-6: Diamond-Metal Composite Package for High-Power RF Device';
- 'We1H-1: KEYNOTE: LNA and Power Amplifiers for Operation up to 100 GHz';
- 'We1H: X-Band III-V MMIC Power Amplifiers with Harmonic Control';
- 'We2H: High-efficiency Power Amplifiers for 6G FR3 Handset and MIMO Radar Applications';
- 'Th2G-6: First Demonstration of a MMIC Low-Noise Amplifier Operating at Ka-Band Realized with Enhancement-mode Gallium Nitride HEMTs'.

www.ims-ieee.org
www.macom.com

Wise Integration launches first digital controller for GaN totem-pole PFC

WiseWare 1.1 enables high switching frequency up to 2MHz

Fabless company Wise-integration of Hyeres, France — which was spun off from CEA-Leti in 2020 and designs and develops digital control for gallium nitride (GaN) and GaN IC-based power supplies — has released to production its first fully digital controller, WiseWare 1.1 (WIW1101), based on a 32-bit MCU. This enables high-frequency operation up to 2MHz, unlocking what are claimed to be new levels of power density, efficiency and form factor in compact AC–DC power converters.

The product is now available and ready for volume production in customer-validated designs.

"This release marks a strategic milestone for Wise Integration's roadmap," says CEO Thierry Bouchet. "WiseWare 1.1 represents more than a product — it's a key pillar in our vision to redefine power electronics through digital control. It strengthens our value proposition in high-density power conversion."

Digitally driven, GaN optimized

Unlike legacy analog solutions, WiseWare 1.1 leverages the speed and switching capabilities of GaN through a proprietary digital control algorithm in a 32-bit MCU, enabling zero-voltage switching (ZVS) across all power transistors. Designed specifically for totem-pole power-factor correction (PFC) architectures in critical-construction mode (CrCM), this controller allows engineers to dramatically reduce the size, weight and thickness of magnetic components while maintaining >98% efficiency.

Customer-proven performance and global momentum

WiseWare 1.1 supports a broad power range from 100W to 1.5kW, suiting a wide array of modern applications requiring both compactness and high energy efficiency.

Designed with flexibility in mind, WiseWare 1.1 works seamlessly with standard GaN across the full $R_{DS(on)}$ spectrum (drain–source on-resistance), giving power designers the freedom to choose the optimal transistor for each application — without compromising performance.

Typical applications include:

- high-efficiency AC–DC power converters;
- high-power-density designs;
- power supplies for servers;
- USB power delivery adapters for laptops and notebooks; and
- switch-mode power supplies for monitors and displays.

The WiseWare 1.1 platform has already demonstrated robust market validation, with multiple customer design-ins and live demos at PCIM Europe, one of the industry's most prominent power- electronics exhibitions. These demonstrations showcased 300W totem-pole PFC converter boards using WiseWare 1.1 and WiseGan WI71060A transistors ($R_{DS(on)}$=60mΩ), operating from 90–264V_{AC} input to a 400V_{DC} output. At the same time, technical collaborations are progressing in Asia, reinforcing the firm's global reach.

www.wise-integration.com

SweGaN appoints new chairman and board members

Pontus de Laval, Leif Johansson and Gerry Maguire join SweGaN's board, as David Lam steps down as interim chairman

SweGaN AB of Linköping, Sweden, a developer and manufacturer of custom gallium nitride on silicon carbide (GaN-on-SiC) epitaxial wafers, based on proprietary growth technology, has announced several key board appointments supporting its growth in telecom, satcom, defense, and power electronics.

Pontus de Laval, senior advisor at Navigare Ventures (a SweGaN shareholder), has been appointed chairman of the board. Leif Johansson and Gerry Maguire join as board members, while David Lam steps down as interim chairman and will remain a deputy board member.

A former CTO of Saab and affiliated with the Knut and Alice Wallenberg Foundation, de Laval brings extensive leadership experience in Sweden's technology and defense sectors.

"I'm excited to lead the executive board and deepen collaboration with SweGaN—a standout Swedish semiconductor company with patented innovation and a highly skilled team. With its cutting-edge research and product development, SweGaN is well-positioned to become a global leader in semiconductor material manufacturing, supporting a growing range of critical applications and regional supply chains," says de Laval, SweGaN's newly appointed chairman.

Leif Johansson, recognized as one of Sweden's most influential business leaders and a member of the Royal Swedish Academy of Engineering Sciences, has served as board chair of Ericsson and AstraZeneca, and as CEO of both Volvo Group and Electrolux, among other executive roles.

"As Sweden strengthens its position in the evolving European semiconductor industry, success will depend on the innovation, research, and drive of pioneering companies like SweGaN. Collaborating with Pontus, Ted, and the team to shape the company's future promises to be an exciting journey," says Johansson.

Gerry Maguire, co-founder and general partner at Atlantic Bridge, brings over 30 years of experience in the technology industry as an investor, executive, and design engineer. Previously, he was vice president of R&D at Parthus Technologies, where he played a key role in its IPO on Nasdaq. He has also held senior roles at Philips and Texas Instruments.

"I'm impressed by the groundbreaking semiconductor initiatives SweGaN is already part of, supported by Sweden and the EU," says Maguire. "I look forward to joining the team and helping drive its inspiring growth and industry impact."

"On behalf of SweGaN and our management team, I'd like to thank David Lam for his invaluable contributions over the past three years," says Jr-Tai Chen, SweGaN's CEO and co-founder. "David has played a pivotal role—alongside the executive board—in guiding our evolution from a research-driven startup to a recognized commercial semiconductor manufacturer following our Series A investment."

"We're pleased that David will continue as a deputy board member and are delighted to welcome Gerry Maguire from Atlantic Bridge. Gerry brings a rare combination of engineering, executive, and investment experience, with deep knowledge of the European market—an ideal fit for SweGaN's strategic transformation and expansion."

"As we enter the next phase of our journey, I'm also excited to work more closely with our new chair, Pontus de Laval, and to welcome Swedish business leader Leif Johansson," continues Chen. "They bring exceptional networks and decades of leadership in technology and defense. These combined forces will help sharpen our focus as we scale infrastructure and production, advance our technologies, and expand into the power electronics market — strengthening supply chain resilience across Europe."

www.swegan.com

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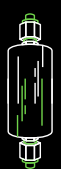
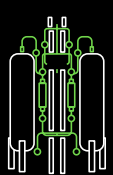
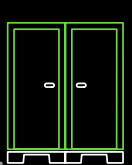


Point-of-Use Purifiers



Frame-Mounted Purifiers



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Navitas plans 200mm GaN production with PSMC

100V family to enter production in first-half 2026; 650V devices to transition from TSMC over next 12–24 months

Gallium nitride (GaN) power IC and silicon carbide (SiC) technology firm Navitas Semiconductor Corp of Torrance, CA, USA has announced a strategic partnership with Taiwanese foundry Powerchip Semiconductor Manufacturing Corp (PSMC) to start production and continue development of 200mm GaN-on-silicon technology.

Navitas' GaN IC portfolio is expected to use Powerchip's 200mm in Fab 8B, located in Zhunan Science Park. The fab has been operational since 2019 and supports various high-volume manufacturing processes for GaN, ranging from micro-LEDs to RF GaN devices.

Powerchip's capabilities include an improved 180nm CMOS process, offering smaller and more advanced geometries, which bring improvements in performance, power efficiency, integration, and cost. "200mm GaN-on-silicon production on a 180nm process node enables us to continue innovating higher-power-density, faster and more efficient devices while simultaneously improving cost, scale and manufacturing yields," says Dr Sid Sundaresan, senior VP of WBG Technology Platforms at Navitas.

Powerchip is expected to manufacture Navitas' GaN portfolio with voltage ratings from 100V to 650V, supporting the growing demand for GaN for 48V infrastructure, including hyper-scale AI data centers and electric vehicles (EVs). Qualification of initial devices is expected in fourth-quarter 2025. The 100V family is expected to start production first at Powerchip in first-half 2026. The 650V devices are expected to transition from Navitas' existing supplier TSMC to Powerchip over the next 12–24 months.

Navitas recently made several announcements in the AI data center, EV and solar markets, including its collaboration with NVIDIA to support GaN and SiC technologies for 800V HVDC architectures for 1MW IT racks and beyond. Enphase announced that its next-generation IQ9 would include Navitas' 650V bi-directional GaNFast ICs, and Changan Automobile announced its first commercial GaN-based OBC (on-board charger) using Navitas' GaNSafe technology.

"Through our partnership with Powerchip, we are well-positioned to drive sustained progress in product performance, technological evolution, and cost efficiency," reckons Navitas' CEO & co-founder Gene Sheridan.

"Powerchip has collaborated with Navitas on GaN-on-Si technology for years, and we're thrilled to announce that product qualification is nearly complete — bringing us to the verge of mass production," says Powerchip's president Martin Chu. "Building on this strong partnership, Powerchip is committed to expanding our cooperation and continuously supporting Navitas in exploring and growing the GaN market."

www.powerchip.com
www.navitassemi.com

UGREEN adds first 500W GaN charger to Nexode series

Hong Kong-based UGREEN (which provides charging accessories) has unveiled the Nexode 500W 6-Port GaN Desktop Fast Charger, which is claimed to be the first 500W gallium nitride (GaN) charger engineered to simultaneously charge six devices with unprecedented power. Combining groundbreaking charging power, intelligent safety systems, and near-universal compatibility, it is built to handle the high-performance demands of professionals, gaming setups, and tech-heavy households.

The Nexode 500W 6-Port GaN Desktop Fast Charger eliminates the need for multiple adapters due to its five USB-C ports and one USB-A port, enabling concurrent fast charging for six devices. Professionals can power five high-end laptops and a smartphone from a single compact unit. One of the five USB-C ports can deliver up to 240W output to a single device, which is enough to charge a MacBook Pro 16" at maximum speed (from 0 to 60% in about 30 minutes). Although there are very few devices currently on the market that can fully utilize 240W USB-C input charging, UGREEN says that it anticipated future needs.

At its core, six integrated GaN chips achieve a 95% energy conversion rate, minimizing heat and reducing energy loss. Equipped with multi-channel NTC sensors, the Nexode 500W charger monitors temperature in real time, ensuring stable and safe charging even under continuous 500W loads, preventing overheating and damage during prolonged high-intensity use. It is suitable for demanding environments such as offices, studios and high-performance gaming setups.

Universal compatibility and smart power management

Designed for versatility, the Nexode 500W supports PD 3.1/3.0/2.0, QC 3.0, PPS, AFC, FCP, Apple 5V/2.4A and BC 1.2 protocols, ensuring compatibility with nearly all laptops, smartphones, tablets and accessories. Its adaptive power distribution dynamically allocates wattage based on device requirements — prioritizing high-power needs like a gaming laptop while maintaining optimal speeds for lower-wattage devices such as smartphones, all without manual intervention.

www.ugreen.com

Innoscience and Midea partner to accelerate GaN adoption in home appliance industry

Innoscience's 700V GaN integrated into products of Midea's Kitchen & Bath Appliances Division

InnoScience (Suzhou) Technology Holding Co Ltd — which manufactures gallium nitride on silicon (GaN) power chips on 8" silicon wafers — and Midea (the largest producer of home appliances and industrial robots) have reached a strategic collaboration and agreed to jointly invest resources to focus on expanding the adoption of GaN in new applications such as home appliances, kitchen appliances and other fields.

Leveraging GaN solutions' high-frequency, high-efficiency and low-energy consumption characteristics, Midea and Innoscience aim to accelerate the adoption of GaN technology, driving product innovation and shaping a more energy-efficient and sustainable future for the home appliance industry.

The Midea R&D team has integrated the performance advantage of GaN technology offered by Innoscience with advanced FOC (field-oriented control) algorithms. This marks the first commercial application of GaN-based solution in high-efficiency kitchen ventilation systems, broadening the adoption of GaN across Midea's smart home appliance portfolio.

In the future, Innoscience's GaN solutions will also be further integrated into Midea's air conditioners, refrigerators, washing machines, water dispensers' lineup.

www.innoscience.com

Navitas and BrightLoop Converters partner

GeneSiC MOSFETs boost power density for high-voltage, high-power multi-verters in fuel-cell chargers and heavy-duty transportation

Gallium nitride (GaN) power IC and silicon carbide (SiC) technology firm Navitas Semiconductor Corp of Torrance, CA, USA has partnered with BrightLoop Converters of Paris, France (which develops and manufactures high-efficiency, high-reliability power converters) to support their latest series of hydrogen fuel-cell chargers with automotive-qualified Gen 3 'Fast' SiC (G3F) MOSFETs for heavy-duty agricultural transportation equipment.

"Both companies provide the technology and system leadership to enable the roadmap for next-generation, high-power-density, high-reliability converter solutions," says Navitas' CEO & co-founder Gene Sheridan.

BrightLoop offers power conversion efficiencies of over 98% and power densities up to 35kW/kg and 60kW/L. Their high-voltage, high-power multi-verters, paired to BrightLoop's Power Flow Processor technology, are designed to deliver exceptional performance in both AC and DC applications, such as energy management scenarios for fuel cells and heavy-duty applications, as well as high-voltage HV network adaptation.

Navitas' auto-qualified G3F SiC MOSFETs are incorporated into BrightLoop's 250kW HV-DC/DC converter, with an output of 950V_{DC} at 480A, and can be paralleled to achieve megawatt power capability.

Enabled by 20 years of SiC innovation, GeneSiC proprietary 'trench-assisted planar' technology provides what is said to be world-leading performance over temperature, delivering high-speed, cool-running operation for high-power, high-reliability applications. G3F SiC MOSFETs deliver high efficiency with high-speed performance, enabling up to 25°C lower case temperature, and up to 3x longer life than silicon carbide products from other vendors, it is claimed.

Both companies provide the technology and system leadership to enable the roadmap for next-generation, high-power-density, high-reliability converter solutions

Trench-assisted planar technology enables an extremely low $R_{DS(ON)}$ increase versus temperature, which results in the lowest power losses across the complete operating range and offers up to 20% lower $R_{DS(ON)}$ under real-life operation at high temperatures compared with the competition. All GeneSiC MOSFETs have the highest-published 100%-tested avalanche capability, 30% longer short-circuit withstand time, and tight threshold voltage distributions for easy paralleling.

"Navitas offers leading-edge SiC technology where efficiency, ruggedness and reliability are paramount," comments BrightLoop's CEO & founder Florent Liffran. "Our high-power-density, smart, efficient and scalable multi-verters lead the industry by enhancing the quantity and quality of energy delivered to our customers," he adds,

www.brightloop.fr/en
www.navitassemi.com

Incize and Atomera collaborate on GaN-on-Si technology for next-generation RF and power devices

Ultra-thin silicon film technology to be integrated into GaN-on-silicon using Incize's measurement techniques

Semiconductor characterization and modeling company Incize of Louvain-la-Neuve, Belgium and semiconductor materials and IP licensing company Atomera Inc of Los Gatos, CA, USA have announced a strategic collaboration to enhance gallium nitride on silicon (GaN-on-Si) technologies.

Whereas traditional silicon is hitting its performance ceiling in certain applications, GaN-on-Si offers a scalable, cost-effective alternative by taking advantage of GaN's performance with silicon's manufacturability. Combining Atomera's Mears Silicon Technology (MST) with Incize's advanced characterization is expected to accelerate the path to volume production of next-generation RF and power devices.

The partnership brings together Atomera's proprietary MST — a quantum-engineered, ultra-thin silicon film that improves transistor performance, energy efficiency and reliability — with Incize's characterization platforms, covering substrate trap analysis, noise, linearity, thermal effects and RF performance from DC to mmWave.

Specifically, the collaboration will explore the integration of MST into GaN-on-Si device structures, using Incize's proprietary measurement techniques to evaluate:

- improved interface quality between GaN layers and silicon substrates;
- reduced parasitic effects and substrate losses;
- lower trap-induced noise and leakage; and
- enhanced linearity and RF power handling.

The joint program will concentrate on optimizing GaN-on-Si device performance for high-frequency and high-power applications, with target markets in wireless infrastructure (5G/6G), satellite communications and advanced power electronics.

Atomera's MST technology has already demonstrated promising advantages in silicon-based devices, comments Incize's CEO Dr Mostafa Emam. "By leveraging our advanced RF technology enablement capabilities and applying them to Atomera's innovation, we aim to unlock new frontiers of performance, efficiency and reliability in GaN-on-Si platforms," he adds.

"Incize's track record with GaN-on-Si and their superb measurement and modeling capabilities make them an ideal partner," believes Atomera's CEO Scott Bibaud. "Together, we are exploring how MST can be harnessed to propel compound semiconductor devices forward," he adds.

"It is most gratifying to see MST being explored beyond conventional silicon," says Atomera's founder & chief technology officer Dr Robert Mears. "GaN-on-Si is a fascinating and rapidly evolving field, and Incize's in-depth understanding of RF device physics and their world-class measurement capability provide an excellent opportunity to investigate how MST can contribute to advancing this important technology."

www.incize.com
www.atomera.com

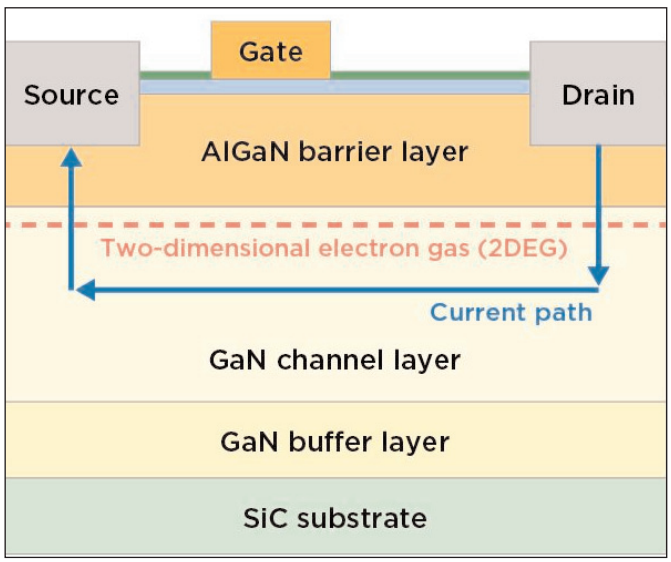
Elucidation of scattering mechanism of 2DEG in PAMBE-grown ScAlN/GaN heterostructure

Improved GaN-HEMT performance paves way for advances in next-generation high-frequency communications

As presented at the International Conference on Nitride Semiconductors (ICNS-15) in Malmö, Sweden (6–11 July) in a paper by Kouei Kubota et al, 'Scattering Mechanism of 2DEG in ScAlN/GaN Heterostructures Grown by Plasma-Assisted Molecular Beam Epitaxy', Japan's Sumitomo Electric Industries Ltd — through joint research with the research group led by assistant professor Takuya Maeda of the University of Tokyo's School of Engineering — has discovered the scattering mechanism of a two-dimensional electron gas (2DEG) in a heterojunction formed from scandium aluminium nitride (ScAlN) and gallium nitride (GaN). ScAlN/GaN is a strong candidate to be the barrier layer in next-generation high-frequency GaN high-electron-mobility transistors (GaN HEMTs).

In the GaN HEMT structures for high-frequency applications, GaN crystals are grown on a silicon carbide (SiC) substrate, and a heterojunction is formed by aluminium gallium nitride (AlGaN) grown by plasma-assisted molecular beam epitaxy (PAMBE) on top of the GaN crystal to create a two-dimensional electron gas (2DEG) on the interface, through which electrons move at high speed.

In the latest research work, Sumitomo Electric provided the high-quality GaN/SiC substrates. The University of Tokyo performed the fabrication of ScAlN/GaN heterojunctions on GaN/SiC substrates, as well as measurement and analysis. Specifically, transport properties were investigated in detail by temperature-dependent Hall-effect measurements.



Structure of commonly used GaN HEMTs.

ScAlN, which has a high electron generation capability, is attracting attention as a next-generation barrier layer to develop higher-frequency and higher-power GaN HEMTs. However, up to now the heterojunction between ScAlN and GaN attracts a high density of electrons but its mobility is limited by some scattering factors. The limiting factor for mobility has not been understood.

Due to the high density of the 2DEG, the research group pointed out the need to consider the increase in the electron effective mass caused by the non-parabolicity of the conduction band, and quantitatively discussed the impacts of polar optical phonon, acoustic deformation, and interface roughness scattering.

The new study found that the mobility of a 2DEG in a ScAlN/GaN heterostructure is limited mainly by interfacial roughness scattering (in which irregularities at the interface of a heterojunction impede the transfer of electrons), which is the dominant scattering mechanism.

Moving forward, the researchers therefore hope to improve the interfacial roughness and achieve high-density and high-mobility 2DEG formation to enhance the performance of GaN HEMTs used in next-generation high-frequency communications.

https://mkon.nu/icns-15
www.sedi.co.jp
www.t.u-tokyo.ac.jp

University of Michigan synthesizes high-quality 2D molybdenum disulfide using Veeco Fiji ALD system

Di-tert-butyl disulfide provides comparable film characteristics to traditional H_2S-based growth, while enabling safer growth of 2D transition-metal di-chalcogenides

Using the Fiji G2 plasma-enhanced atomic layer deposition (PEALD) system of epitaxial deposition and process equipment maker Veeco Instruments Inc of Plainview, NY, USA, the University of Michigan has reported the ALD of molybdenum disulfide (MoS_2) using di-tert-butyl disulfide (TBDS) as a replacement for hydrogen sulfide (H_2S) (Chemistry of Materials vol 37, issue 4, 11 February 2025).

H_2S has been used in many sulfide ALD processes, but it is a toxic gas that requires expensive containment and abatement measures for shipping, installation and storage. In contrast, TBDS is a liquid that is significantly less hazardous and expensive than H_2S.

Chemistry, Materials Science and Engineering professor Ageeth Bol and her team of students and post-doctoral students used a PEALD process to deposit high-quality two-dimensional (2D) MoS_2 using an organometallic precursor and TBDS, in combination with hydrogen (H_2) plasma. This research introduces a method of using TBDS liquid that is significantly less hazardous than H_2S and eliminates the need for expensive safety measures associated with H_2S use.

Growing interest in addressing the challenges of adopting two-dimensional materials in high-volume manufacturing has prompted a wide range of R&D activity, spurring collaboration between equipment suppliers and stakeholders.

Two-dimensional materials have unique, controllable properties, including exceptional electrical conductivity, durability and optical transparency. These properties enable applications in flexible displays, sensors, energy storage, and optoelectronics.

"This development is an important step in the evolution of enabling large-scale integration of 2D transition-metal di-chalcogenides into commercial devices," believes Ganesh Sundaram, VP of technology for ALD & MBE at Veeco.

"The synthesis route undertaken by professor Bol and her group resulted in high-quality, stoichiometric molybdenum disulfide film [with limited contamination], and additionally resolves the safety and cost issues that can be associated with the use of traditional hydrogen sulfide-based processes."

The TBDS-based PEALD process was also analyzed via mass spectrometry to determine the mechanistic roles of each reactant. Apparently, H_2 plasma removes ligands from the chemisorbed Mo precursor, which allows TBDS to sulfurize the top layer, producing H_2S and isobutene as byproducts. MoS_2 films deposited via the TBDS-based process possessed fewer yet taller out-of-plane growths and similar crystal grain diameter (~10nm) and electrical resistivity (13.6–15.5Ωcm for 3nm-thick films) compared with films made with H_2S. Thus, the TBDS-based process is a suitable and safer alternative to the H_2S-based process for large-area synthesis of layered MoS_2.

Veeco's Fiji plasma-enhanced ALD system is a modular, high-vacuum thermal ALD system that supports thermal and plasma-enhanced deposition. "We've been pleased with the performance and capabilities of the Fiji and with our interactions with Veeco's scientific team," states Bol. "Indeed, we are in the process of commissioning a second Fiji system for our group, which is the third system received by the University of Michigan, to support further research activities."

https://pubs.acs.org/doi/pdf/10.1021/acs.chemmater.4c02561
https://qstl.engin.umich.edu
www.veeco.com

UMass Lowell assistant professor Anhar Bhuiyan receives Ralph E. Powe Junior Faculty Enhancement Award

Early-career support to aid grant applications for Ga_2O_3 device research

The University of Massachusetts Lowell says that Electrical Engineering assistant professor Anhar Bhuiyan is among 36 recipients of this year's Ralph E. Powe Junior Faculty Enhancement Awards, nationally competitive seed grants for faculty in the first two years of their academic careers. The award supports Bhuiyan's research into next-generation materials and components for powering satellites and unmanned spacecraft.

The $5000 seed grants, which are matched by the recipients' universities for a total of $10,000, are awarded annually by Oak Ridge Associated Universities, a non-profit consortium promoting US scientific and technological research and education. It is affiliated with Oak Ridge National Laboratory.

Bhuiyan says that the award provides recognition and support at a critical point in his career and will help him to build a foundation to apply for larger grants. "Early-career faculty bring fresh perspectives, and support like this allows us to test and validate our ideas right away," he adds.

Bhuiyan already had numerous research publications to his name when he graduated from Ohio State University two years ago with his Ph.D. There, he worked with professor Hongping Zhao on research into making and using gallium oxide, which is known for its ability to handle very high voltages and manage large amounts of electrical power in systems that support power grids, electric transportation, satellites and space exploration.

"We are exploring how gallium oxide could go beyond the current capabilities of conventional materials such as silicon, silicon carbide and gallium nitride," says Bhuiyan. "While those materials have been successful in many electronic power applications, gallium oxide offers added advantages in high-power systems, thanks to properties that allow it to withstand very high voltage and support compact power system designs."

Anhar Bhuiyan.

Gallium oxide also offers high stability in extreme environments, including the ability to function reliably under high temperatures and radiation, with electrical properties that can be carefully controlled to suit different applications.

"Satellites or autonomous space vehicles require very high power to operate, so we are trying to protect those power modules with our material. They need to be very small and lightweight; they also need to operate energy efficiently," Bhuiyan says. "Gallium oxide technology can provide all these advantages — high energy, high power — and devices based on this are very lightweight and small."

However, the material has one significant drawback. It is not good at dissipating the heat that builds up in high-power components. Excessive heat can damage a device, reduce its efficiency and limit its ability to operate in harsh environments like space.

That is what Bhuiyan's current research is trying to solve — specifically by adding a layer of diamond (well known for its ability to conduct heat) to high-voltage devices made of gallium oxide.

"For this award, we proposed making gallium oxide high-power diodes that will have enhanced thermal management by integrating diamond," Bhuiyan says. "Diamond also could make them more radiation-tolerant."

Bhuiyan is collaborating with researchers from the Air Force Research Laboratory, the University at Buffalo, and Ohio State to help advance gallium oxide electronics for use in space and defense a pplications.

In his first two years at UMass Lowell, Bhuiyan has devised a process and custom-built a machine for making thicker gallium oxide film than he was working with at Ohio State. He is also using this material to fabricate a type of high-voltage diode.

While he can perform most tests on the gallium oxide films and diodes in his own lab, Bhuiyan uses UML's research reactor to test how different types and levels of radiation affect them, simulating the extreme conditions of space. "For my work, the radiation laboratory is a very crucial component," he says. "We are radiating those films and diodes together so that we can understand the impact of the radiation from both the material and device perspectives."

Bhuiyan's first-year Ph.D. student, Ahmed Ibreljic, has also recently been selected as a Draper Scholar by Draper Laboratory, an anchor partner in the Lowell Innovation Network Corridor (LINC), a public–private–academic initiative on East Campus. Ibreljic will receive full funding for his doctoral studies from Draper for the next four years. That's part of a close collaboration between Bhuiyan's lab and Draper on developing radiation-hardened gallium oxide technology. "With Ahmed's funding secured, I can now allocate some of my university startup resources to expanding the research team and accelerating progress in this critical area," he notes.

www.uml.edu/engineering/electrical-computer/faculty/bhuiyan-a-f-m-anhar-uddin.aspx
www.orau.org/partnerships/grant-programs/powe

Silvaco and Fraunhofer ISIT collaborate on developing GaN device technology

Power Devices Solution to perform design technology co-optimization

Silvaco Group Inc of Santa Clara, CA, USA — which provides technology computer-aided design (TCAD), electronic design automation (EDA) software and semiconductor intellectual property (SIP) for process and device development — has announced a strategic R&D collaboration with Fraunhofer Institute for Silicon Technology (ISIT) of Itzehoe, Germany, which develops and manufactures customer-specific components for power electronics and microsystems technology.

The partnership aims to accelerate development of next-generation gallium nitride (GaN) devices using Silvaco's Power Devices Solution to perform design technology co-optimization (DTCO). This collaboration aligns with Fraunhofer ISIT's role in the EU Chips Act initiative through its participation in the pilot line 'Advanced Packaging and Heterogeneous Integration for Electronic Components and Systems' (APECS).

Fraunhofer ISIT's Power Electronics division is developing and manufacturing device prototypes for high-performance power electronic and sensor systems. Fraunhofer ISIT will leverage Silvaco's design tools — including the Victory TCAD platform, Utmost IV, and SmartSpice — to perform design technology co-optimization for power and sensor device development. Silvaco's DTCO platform will enable accelerated prototyping in Fraunhofer ISIT's post-CMOS process environment, which is set up to explore emerging processes for both GaN and MEMS technologies on 8-inch wafers.

In addition, Silvaco's Victory Design of Experiments (DOE) solution will streamline development workflows and support rapid innovation during the evaluation of novel process modules and emerging device concepts.

"This collaboration marks a significant step forward in strengthening Europe's semiconductor capabilities and driving the global evolution of GaN devices," reckons Eric Guichard, senior VP & general manager of Silvaco's TCAD Division. "Institutes like Fraunhofer ISIT are instrumental in pushing the boundaries of innovation in device and process technology. By collaborating with Fraunhofer ISIT, we not only accelerate their development efforts but also enhance our own TCAD tools to meet the demands of future device design," he adds.

"By using Silvaco's advanced TCAD solutions, our teams can explore, understand and optimize the performance of GaN devices with greater depth and efficiency," says Michael Mensing Ph.D., head of the Advanced Devices Group at Fraunhofer ISIT. "Especially during our current development of high-voltage lateral and vertical GaN devices based on engineering substrates, like Qromis Substrate Technology, we see many physical effects that require accurately calibrated process and device models," he adds.

In addition to the active utilization of Silvaco's tools in R&D and industry customer projects, Fraunhofer ISIT will train students at local universities in the utilization of Silvaco's Victory TCAD platform to prepare the next generation of semiconductor device engineers.

www.apecs.eu
www.isit.fraunhofer.de/en.html
www.silvaco.com

Wavetek deploys Silvaco's Victory TCAD for GaN-based device development

Silvaco's Victory TCAD solution has been adopted by gallium arsenide foundry Wavetek Microelectronics Corp of Hsinchu Science Park, Taiwan for the development of next-generation gallium nitride devices targeting high-performance connectivity applications in 5G, Wi-Fi and IoT.

As demand for high-efficiency, high-frequency GaN devices rises, Wavetek is leveraging Silvaco's simulation tools to design and optimize high-electron-mobility transistors (HEMTs) and pseudomorphic HEMTs (pHEMTs). Victory TCAD is said to deliver accurate GaN-based device models, enabling rapid prototyping and robust device performance evaluation before fabrication.

"Silvaco's Victory TCAD platform gives us the ability to precisely model GaN device behavior under real-world conditions," comments Wavetek's chief technology officer Dr Barry Lin. "This level of insight is critical for achieving the performance and reliability targets demanded by next-generation RF and power applications."

Silvaco notes that the Victory suite supports a wide range of advanced technologies including RF, power, photonics, CMOS, memory, and display. With device simulation, process modeling and parameter extraction capabilities, Victory TCAD helps semiconductor companies to accelerate R&D cycles and reduce time-to-market.

"Our simulation solutions are engineered to meet the rigorous demands of modern semiconductor innovation in high-frequency and wide-bandgap market segments," says Eric Guichard Ph.D., senior VP & general manager of Silvaco's TCAD Division.

www.wtkmicro.com/en-global

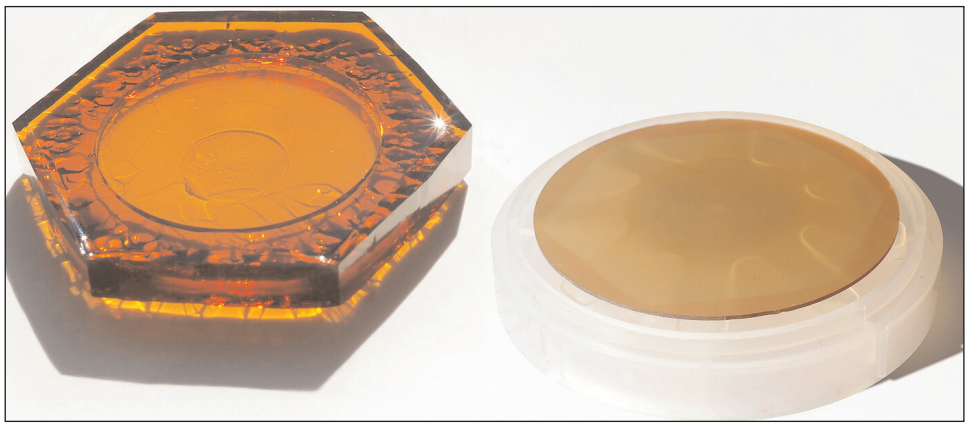
IKZ, PVA Tepla and Siltronic project to provide 4" AlN for power electronics and UV photonics

PVT growth of AlN to be scaled up from 2-inch diameter

Germany's Leibniz-Institut für Kristallzüchtung im Forschungsverbund Berlin e.V. (IKZ), Wettenberg-based microwave & radio frequency plasma system maker PVA TePla AG and Munich-based silicon wafer maker Siltronic AG are collaborating in a project to scale up aluminium nitride (AlN) crystal growth. The project focuses on the fabrication of 4-inch AlN substrates to enable advanced applications in high-power electronics and ultraviolet photonics.

Ultra-wide bandgap (UWBG) AlN is characterized by intrinsic properties that include high critical electric field strength, superior thermal conductivity, and optical transparency in the ultraviolet spectrum. These attributes make AlN a highly promising substrate and device material for next-generation power electronic components and UV disinfection technologies, enabling compact, energy-efficient, and thermally robust device architectures.

The project's focus on scaling AlN crystal diameters from 2-inches to 4-inches addresses a fundamental requirement for transitioning this key material from research-scale to industrial manufacturing environments. The project aims to contribute to advancing Europe's sovereignty in semiconductor materials research. AlN-based power electronics enable major efficiency gains in electro-mobility, renewable energy, and industrial systems. In UV photonics, new opportunities arise in areas such as disinfection (preventing pandemics and water treatment), production technology (material processing), agriculture



Aluminium nitride crystal and wafer © IKZ.

(yield enhancement), as well as sensors and medical applications.

The partners are leveraging their respective core competencies to jointly develop a market-ready technology for the industrial production of AlN crystals.

The Leibniz Institute for Crystal Growth (IKZ) has long-standing expertise in growing AlN crystals and has a proven 2-inch AlN crystal growth platform. Due to a leading position in producing high-quality AlN wafers, the institute is widely acknowledged as a European reference in this field of technology, it is claimed.

Siltronic (one of the world's leading producers of silicon wafers, using both Czochralski and float-zone methods) contributes its experience in R&D of substrates for power electronics and in precision metrology – both of which are crucial for the industrial application of AlN wafers.

PVA TePla provides high-tech solutions in material and metrology technology, with decades of experience in manufacturing crystal growing systems. With its expertise in the physical vapor transport (PVT) method, particularly based on comprehensive experience from the silicon carbide (SiC) market, PVA TePla says that it provides the technological equipment foundation for a reliable and reproducible growth process for bulk AlN crystals with industry-relevant diameters. This is a central prerequisite for scaling and industrializing AlN technology.

Through their collaboration, IKZ, PVA TePla and Siltronic say they are demonstrating their commitment to Europe's technological sovereignty and the sustainable development of a semiconductor materials value chain. "Expansion from 2-inch to 4-inch is a crucial milestone in making AlN accessible for mass production," say the project partners. "Thanks to the synergies among the partners, we can overcome the technological barriers."

www.ikz-berlin.de/en
www.pvatepla.com/en/products/crystal-growing-systems
www.siltronic.com

Diamond Technologies acquires Akhan's asset portfolio, including patents in diamond films

DTI to commercialize key technologies in Miraj Diamond platform

Materials innovation company Diamond Technologies Inc (DTI) of Hudson, MA, USA (which is developing and commercializing diamond-based solutions for semiconductors, aerospace, defense, optics and industrial applications) has acquired the complete asset portfolio of AKHAN Semiconductor Inc of Gurnee, Lake County, IL, USA (which was founded in 2013 and specializes in the fabrication and application of synthetic, lab-grown, electronics-grade diamond materials). The transaction includes all patents, trade secrets, intellectual property, proprietary machinery, and engineered materials developed by Akhan over the past decade.

DTI reckons that the acquisition positions it at the forefront of advanced materials innovation, with a patent portfolio focused on diamond film systems, manufacturing methods, and substrate integration — technologies increasingly sought after by semiconductor foundries and equipment manufacturers facing the limitations of legacy materials, the firm adds.

"Leading-edge semiconductor companies and equipment makers are in a race to break through the thermal and physical barriers of traditional materials," says CEO Jerry McGuire. "The diamond technologies now under DTI's control represent a viable, scalable path forward for the entire industry."

DTI aims to move swiftly to commercialize key technologies in Akhan's Miraj Diamond platform, with initial focus on applications in:

- thermally superior wafer substrates and spreaders for high-performance semiconductors;
- next-generation tooling and wear-resistant components for chip fabrication;
- diamond coatings for optical, defense and display technologies.

The firm has identified several strategic intersections between the acquired IP and ongoing initiatives in lithography, photonics and thermal management at leading chipmakers and semiconductor tool suppliers.

DTI is actively seeking strategic partners for co-development, licensing and technology integration. It says it is prepared to engage with global firms across semiconductors, aerospace, optics and defense to deploy Miraj Diamond technologies in commercial applications.

www.akhansemi.com
www.dtech.inc

Indium Corp joins Virginia Tech's Center for Power Electronics Systems consortium

Company to leverage innovations in materials science and align R&D initiatives to address future power device requirements

Indium Corp of Clinton, NY, USA (a supplier of refined gallium, germanium, indium and other specialty technology metals) has joined Virginia Tech's Center for Power Electronics Systems (CPES), an industry consortium that supports power electronics initiatives to reduce energy use while growing capability.

CPES is dedicated to improving electrical power processing and distribution that impact systems of all sizes, from battery-operated electronics and vehicles to regional and national electrical distribution systems. The organization is said to have a worldwide reputation for its research advances, its work with industry to improve the entire field, and its talented graduates.

With a specific focus on power device packaging, Indium Corp continues to advance its portfolio of die-attach, package-attach and thermal interface materials solutions that are custom-engineered to meet the mission profile demands for power electronics applications.

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"Advancing materials technology is a key enabler to realize our design goals for power electronics," says Ryan Mayberry, senior application development engineer at Indium Corp. "Through collaboration with CPES, Indium Corporation will leverage innovations in materials science and align research and development initiatives to address future power device requirements."

https://cpes.vt.edu
www.indium.com/applications/power-electronics-packaging-and-assembly

CSconnected names first recipients for £1m Supply Chain Development Programme

Awards aim to strengthen and scale compound semiconductor supply chain in South Wales

The South Wales-based compound semiconductor cluster CSconnected, in partnership with Cardiff Capital Region (CCR), has announced the first four successful applicants to its £1m Supply Chain Development Programme, aimed at strengthening and scaling the compound semiconductor supply chain in South Wales.

Funded through CCR, the initiative supports UK-based companies supplying or buying from the CS sector in South Wales, across key industries including advanced manufacturing, semiconductor materials, system integration, and specialist design tools/software. The selected projects represent vital capability development that will enhance economic impact, create new jobs, and accelerate the expansion of the semiconductor supply chain in South Wales.

The awardees are:

- Ffotoneg Ltd will expand its Design to Device photonics services by developing workflow software and in-house epitaxial design capability, enabling the specification of compound semiconductor epiwafer products ready for epitaxial growth by cluster partners such as Compound Semiconductor Centre Ltd and IQE plc.
- KuasaSemi — in collaboration with Swansea University, Vishay Newport, and CSA Catapult — will enhance its next-generation semiconductor simulation software to address key technical challenges in the regional supply chain, improving simulation accuracy, accelerating innovation and boosting economic growth across the industry.
- Pegasus Chemicals will install a cylinder preparation line to support the recycling of high-purity precursor material cylinders.
- RAM Innovations will develop a blueprint for a high-volume silicon carbide (SiC) packaging line in Wales. The project underpins the future scale-up of SiC power module manufacturing, supporting advanced packaging needs aligned with growth at Vishay Newport.

"This program supports exactly the type of innovation and supply chain resilience that's vital to securing the UK's strategic position in compound semiconductors," believes CSconnected's managing director Howard Rupprecht. "These projects highlight the strength and diversity of our regional capability and reflect the ambition we share with CCR to grow the sector's impact at home and internationally," he adds.

"This is a unique funding opportunity for the development of strategic partnerships locally to Wales and the UK and is a critical element of the continued growth of the Compound Semiconductor Cluster in South Wales," comments CSconnected's business development manager Hazel Hung. "The investment announced today allows companies to develop and expand their in-house capabilities as well as bring direct economic benefits to the compound semiconductor organizations in the region."

The CSconnected Supply Chain Development Programme remains a cornerstone initiative to deliver long-term growth, capability and economic value for the Welsh and wider UK semiconductor industry.

www.csconnected.com/projects/projects/csconnected-supply-chain-development-programme

JX to boost InP substrate production capacity by 20%

Tokyo-based JX Advanced Metals Corp is investing about ¥1.5bn ($10.2m) to boost its indium phosphide (InP) substrate production capacity by about 20% at its Isohara Plant in Kitaibaraki City, Ibaraki Prefecture.

In the 'JX Advanced Metals Group Long-Term Vision 2040' formulated in 2019, the firm positioned its focus businesses, which include advanced materials such as semiconductor and information and communication materials, at the core of its growth strategy. To further expand these businesses, it has been working to build the pillars for next-generation revenue to follow its mainstay products such as semiconductor sputtering targets and rolled copper foil.

InP substrates are expected to be one of these pillars. InP substrates are used in applications including optical communication light-emitting and receiving devices, proximity sensors in wearable devices, and industrial image sensors. As one of few global manufacturers of InP substrates, JX has been handling this material for over 40 years.

The rapid growth of generative AI in recent years has created a need for massive and high-speed data processing capabilities, leading to a global boom in the construction of hyperscale data centers. With optical communication increasingly being used for data transmission within these data centers, JX is seeing demand for its InP substrates.

In future, further development is expected in applications requiring real-time performance, such as generative AI, next-generation communications, autonomous driving, medical care, and entertainment. These will require faster and higher-capacity data processing, as well as increased power consumption.

As solutions to these challenges, InP substrates are also expected to be adopted in photonic-electronic convergence technologies, which are being developed as next-generation information and communication infrastructure technologies. If realized, these technologies will not only deliver high performance in such applications but also significantly reduce energy consumption compared with conventional electrical circuits.

JX has hence decided to proceed with the ¥1.5bn capital investment. Anticipating continued high demand for InP substrates in the future, it is also considering further investments, to be made flexibly as needed.

www.jx-nmm.com/english

AXT cuts Q2 guidance from $20–22m to $17.5–18m

Revenue hit by slow issuance of export control permits for GaAs products and weak demand in China

For second-quarter 2025, AXT Inc of Fremont, CA, USA — which makes gallium arsenide (GaAs), indium phosphide (InP) and germanium (Ge) substrates and raw materials — expects preliminary revenue of $17.5–18m, below the guidance of $20–22m provided on 1 May and down from $27.9m a year ago. This is due primarily to slower-than-expected issuance of export control permits for its GaAs products in Q2 and a weaker demand environment in China.

"Though we continue to feel confident about our participation in a number of exciting technology trends, the current geopolitical environment remains challenging across our business," says CEO Morris Young. "Further, the demand environment in China has been weaker than expected for our gallium arsenide substrate business, as well as our consolidated raw material joint ventures," he adds. "That said, we saw a meaningful increase in AI-related demand for indium phosphide in China during Q2 and were also pleased that our subsidiary, Beijing Tongmei Xtal Technology Co, received its first export control permits for indium phosphide late in the quarter. In addition, we remain highly focused on gross margin improvement and, despite the revenue shortfall, we expect to deliver Q2/2025 gross margins in the high single digits."

AXT's full financial results for Q2 will be announced on 31 July.

www.axt.com

AXT board member Christine Russell passes away

AXT says that Ms Christine Russell, a member of the board of directors, passed away on 11 July.

Russell joined the board in December 2019 as an independent director, and served as chair of the Audit Committee and as a member of the Compensation Committee and the Nominating and Corporate Governance Committee.

"AXT is grateful for Christine's exemplary dedication and service to our company," comments CEO Morris Young. "She brought tremendous intelligence, strategic planning and thoughtful decision-making to our board and she will be greatly missed," he adds. "On behalf of AXT's management and board of directors, we extend our sincerest condolences to her family and the breadth of Silicon Valley executives who hold her in high esteem."

Aixtron leading project to increase energy efficiency in silicon carbide layer deposition

Fraunhofer IISB's silicon carbide expertise to combine with bimanu's simulation models

In cooperation with Erlangen-based Fraunhofer IISB (Institute for Integrated Systems and Device Technology) and Neuss-based bimanu Cloud Solutions GmbH in Germany, Herzogenrath-based deposition equipment maker Aixtron SE is leading a joint project 'Increasing Energy Efficiency in SiC Epitaxy'.

Funded by the German Federal Ministry of Education and Research (BMBF), the aim of the €28.4m project is to increase resource efficiency (water and energy consumption, waste volume) in the production of layer structures made from silicon carbide (SiC). AI-based methods are being researched and developed for both material- and energy-efficient manufacturing processes and products. The target is to halve the electrical energy required per unit area in the manufacture of SiC semiconductors.

"Semiconductors based on SiC offer significantly better energy efficiency than conventional silicon, for example in electro-mobility or renewable energies. However, the production of semiconductors is fundamentally energy-intensive. We therefore see a particularly significant opportunity here to make the production of these forward-looking technologies even more efficient and thus promote their widespread use and the green transformation," says professor Michael Heuken, Aixtron's VP Advanced Technologies.

Based on the project work, production processes are to be improved and recommendations for action researched. This is where bimanu's expertise will come into play. The software provider specializes in data integration and analysis in the areas of business intelligence, marketing analytics, Industry 4.0, and energy management.

Fraunhofer IISB is contributing its expertise in SiC, both in R&D in this material class and in the further development of processes, for which it operates Germany's only continuous 150mm SiC development line.

Aixtron's focus within the project will be on researching tool technology and thus advancing tool development. To this end, several test systems will be set up and operated. The simulation models will be verified on these tools, while the data and models will be developed and tested in cooperation with bimanu.

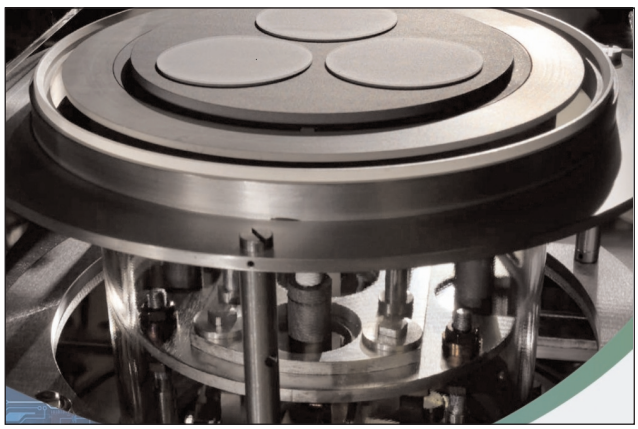
www.iisb.fraunhofer.de
www.bimanu.de
www.aixtron.com

Unipress orders Taiyo Nippo Sanso MOCVD platforms

Poland's Institute of High Pressure Physics to use SR4000HT systems for nitride materials & device R&D

Industrial gas company Taiyo Nippon Sanso Corp (TNSC) of Tokyo, Japan (part of Nippon Sanso Holdings Group) says that multiple TNSC SR4000HT metal-organic chemical vapor deposition (MOCVD) reactors are being purchased by the Polish Academy of Sciences' Institute of High Pressure Physics (IHPP, or Unipress) for its nitride R&D.

"Taiyo Nippon Sanso is very proud to establish a relationship with Unipress for research and development of advanced nitride materials and device technology," says TNSC's senior corporate officer Kunihiro Kobayashi. "Taiyo Nippon Sanso is looking forward to working with professor Michal Bockowski and the Unipress research community to further enhance its already great reputation as leaders in the field of nitride semiconductor research," he adds.



"The selection of multiple TNSC SR4000HT MOCVD systems and partnership with Taiyo Nippon Sanso enables Unipress to have state-of-the-art epitaxial growth capabilities for nitrides in combination with Unipress' established world-class GaN bulk crystal growth technologies," says Unipress' director professor Michal Bockowski. "We are eager to leverage TNSC technology to push the boundaries of nitride semiconductor research."

As research and applications for advanced nitride materials and devices expand, TNSC expects its MOCVD platforms to be the platforms of choice for researchers and manufacturers.

www.unipress.waw.pl
www.MOCVD.jp

IQE and Quinas complete Innovate UK-funded £1.1m ULTRARAM industrialization project

IQE scales up GaSb and AlSb epitaxy for memory tech

Epiwafer and substrate maker IQE plc of Cardiff, Wales, UK and Quinas Technology Ltd (which was spun off from Lancaster University in early 2023) have completed a £1.1m joint project funded by Innovate UK (which provides funding and support for business innovation as part of UK Research and Innovation) to develop a scalable production method for the world's first quantum-powered universal memory ULTRARAM.

Innovate UK awarded the consortium (which included Lancaster and Cardiff Universities) a grant for the one-year project, with Quinas coordinating and the majority of funding deployed with IQE. The project saw IQE scale up the manufacture of compound semiconductor layers initially developed by Lancaster University to an industrial process, the first step towards the commercial production of packaged ULTRARAM chips. IQE hence developed an advanced capability in gallium antimonide (GaSb) and aluminium antimonide (AlSb) epitaxy, representing a world-first for scalable epitaxy for memory devices.

ULTRARAM, a dual-use technology that was invented at Lancaster University, combines the non-volatility of data storage memory, such as flash, with the speed and endurance of a working memory, such as DRAM, while providing significantly improved energy efficiency. ULTRARAM's target applications will include AI, quantum computing, space and defence.

The ULTRARAM project aligns with the UK Government's semiconductor strategy to boost domestic innovation and build sovereign capabilities in key semiconductor technologies. The partners are now exploring further industrialization and pilot production with foundries and strategic collaborators.

"We have successfully achieved our goal of developing a scalable epitaxy process for ULTRARAM, a milestone towards industrial production of packaged chips," says IQE's CEO Jutta Meier. "This project represents a unique opportunity to bring the next generation of compound semiconductor materials to life in the UK and we are proud of our work with Quinas, Lancaster and Cardiff Universities to advance commercial production and create world-leading universal memory devices," she adds.

"This project marks a turning point in the journey from university research to commercial memory products," says Quinas' CEO James Ashforth-Pook. "With IQE's industrial capabilities and Innovate UK's support, we have taken a critical step toward building sovereign capability in memory — the most strategically vital yet underrepresented segment of the UK semiconductor stack," he adds. "ULTRARAM's potential to radically improve energy efficiency in AI, mobile and data-center applications positions Britain as a leader in next-generation memory innovation."

www.iqep.com
www.quinas.tech

III-V Epi brings independent epi manufacturing expertise to Glasgow's Critical Technologies Accelerator program

III–V Epi Ltd of Glasgow, UK — which provides a molecular beam epitaxy (MBE) and metal-organic chemical vapor deposition (MOCVD) service for custom compound semiconductor wafer design, manufacturing, test and characterization — says it is bringing crucial, independent, epitaxial manufacturing expertise to the University of Glasgow's Critical Technologies Accelerator program.

The CTA supports joint academic and industrial collaborative projects for semiconductor, photonics and quantum technology development in Scotland, funded by the UK Government's Innovation Accelerator levelling-up program. The CTA's purpose is to link the University of Glasgow's semiconductor laser development expertise, based at the James Watt Nanofabrication Centre (JWNC), with industrial partners, mitigating research costs. It also targets economic growth in Glasgow and prioritizes support of a Scottish, sovereign supply chain.

"III-V Epi is a business which provides fast-turnaround, low- and medium-volume manufacture of III-V epitaxial structures, complete with testing and characterization support services. This is an essential part of bringing innovative photonics projects to market quickly and efficiently," says the firm's director Calum McGregor. "Like the CTA, we are based in Glasgow, at the heart of Scotland's sovereign, photonics supply chain," he adds.

"Many of the emerging markets targeted by the CTA, including computing, communications, space, fintech, healthcare and defence, favour gallium arsenide material systems for manufacturing flexibility, where we have valuable know-how," McGregor continues. "However, we also work extensively with indium phosphide, widely used in datacoms, telecoms, AI and HPC [high-performance computing]."

CTA has already delivered projects for secure cryptographic, financial transactions and augmented reality (AR) and virtual reality (VR).

www.iii-vepi.com

Quinas wins ICT Start-up category of WIPO Global Awards

World Intellectual Property Organisation recognizes Quinas piloting ULTRARAM from lab research to manufacturable technology

Quinas Technology Ltd (which was spun off from Lancaster University in early 2023) has been named by the World Intellectual Property Organization (WIPO) as winner in the ICT Start-Up category of the 2025 WIPO Global Awards. Quinas is one of just ten companies worldwide to receive this honour and the first ever winner from the UK.

The awards were presented during the 66th WIPO General Assembly at WIPO headquarters in Geneva, in the presence of over 1400 delegates, including representatives from WIPO's 193 member states, international organizations, and innovation experts.

Selected from over 780 applicants across 95 countries, the WIPO Global Awards celebrate small- and medium-sized enterprises (SMEs) that are using IP to drive commercial success and deliver real-world impact through innovation, business growth and positive social impact.

As a winner, Quinas will benefit from a tailored support package that includes strategic mentoring, global visibility, and access to WIPO's international network of IP and business partners.

The award recognizes Quinas' use of IP to transform its ULTRARAM memory from quantum physics research at Lancaster University into a manufacturable universal memory technology with global applications in AI, data centers, and secure computing.

ULTRARAM is a patented compound-semiconductor-based memory technology that combines DRAM-like speed and flash-like retention with ultra-low power consumption, addressing global demands for high-performance, energy-efficient memory. To date, Quinas has secured five granted patents across four jurisdictions, with eight more pending, forming a foundation for its IP-led commercialization strategy.

World Intellectual Property Organization director general Daren Tang presents the award to Quinas chief scientific officer professor Manus Hayne at an awards ceremony in Geneva.

Supported by Innovate UK and working with research and industry partners worldwide, Quinas is advancing the commercialization of ULTRARAM for high-impact applications including AI acceleration, in-memory neuromorphic computing, cybersecurity and low-power edge devices.

"Quinas Technology is honoured to receive this award, which highlights the power of intellectual property to take ideas from lab to market," says Quinas' chief scientific officer professor Manus Hayne. "It's a significant moment to be recognised during the UN International Year of Quantum, as quantum resonant tunnelling is the enabling principle behind ULTRARAM's unique ability to combine speed, endurance and non-volatility in one device," he adds.

The award recognizes Quinas' use of IP to transform its ULTRARAM memory from quantum physics research at Lancaster University into a manufacturable universal memory technology

"This award is a powerful validation of our mission at Quinas: to translate world-class research into sovereign semiconductor innovation with global reach," says CEO James Ashforth-Pook. "As we scale ULTRARAM, IP remains at the heart of our business model — enabling strategic partnerships and safeguarding our long-term competitive advantage."

"Through our Industrial Strategy this government will continue to back British innovation like this breakthrough memory technology — making data centers more energy-efficient to help them grow and compete around the world," states UK Science Minister Lord Vallance.

Quinas has received multiple global awards for innovation, including first prize in the IC Taiwan Global Challenge and Most Innovative Startup at the Flash Memory Summit in Silicon Valley.

www.wipo.int
www.quinas.tech

Space Forge raises £22.6m to accelerate speed of ForgeStar-2 and launch of ForgeStar-1

NATO Innovation Fund-led round includes backing from World Fund, NSSIF and British Business Bank

UK-based Space Forge Ltd, which is pioneering space-based advanced materials manufacturing and return technology, has completed its £22.6m (about $30m) Series A funding round (the largest Series A in UK space tech history).

The round was led by the NATO Innovation Fund, with significant support from a strategic global consortium including World Fund, the National Security Strategic Investment Fund (NSSIF) and the British Business Bank through its Regional Angels Programme.

By harnessing the unique conditions of space-including microgravity, vacuum and extreme temperature differentials, Space Forge aims to unlock the ability to manufacture materials that are impossible to produce on Earth. Such advances have wide-reaching applications in semiconductors, quantum computing, clean energy, and defence tech.

Research suggests that space-made materials could cut CO_2 emissions by 75% and energy use by 60% in key infrastructure, offering a powerful tool for strengthening climate resilience.

The investment should accelerate the development of Space Forge's next-generation returnable manufacturing satellite ForgeStar-2, while supporting its first in-orbit demonstration mission ForgeStar-1, set to launch in 2025.

Together, these missions will demonstrate a scalable, reusable platform for manufacturing high-performance materials in space, for use in security, clean energy and infrastructure applications. The technology offers a pathway to strengthen supply chains for semiconductor production, reducing dependence on vulnerable Earth-based manufacturing systems.

"We're accelerating our mission to make space a practical and accessible

platform for industrial-scale manufacturing," says CEO & co-founder Joshua Western." Our upcoming launches will prove that the future of materials innovation lies beyond Earth, helping us build a more secure, sustainable, and technologically advanced world," he adds.

"Demand for computing power is doubling every two months. Europe imports 80% of its chip supply, with 90% of the world's most advanced semiconductors coming from Taiwan. A geopolitical escalation there could have catastrophic consequences for Europe," notes World Fund general partner Daria Saharova. "We urgently need a resilient, home-grown supply of the next-gen supermaterials required for the future of compute. We also need this home-grown chip supply to be produced sustainably. Space Forge's in-space manufactured semiconductors can reduce energy usage by 75%, by harnessing unique space conditions of microgravity, vacuum and low temperatures. We first backed Space Forge in 2021, long before the link between climate and computing was obvious. This link is clear as day now," she adds.

"As strategic investors, NSSIF is focused on shaping the dual-use technology ecosystem and looks forward to supporting Space Forge's next stage of growth, in line with the ambitions of both the National Space and Semiconductor Strategies," comments a spokesperson from the National Security Strategic Fund.

The Series A round also includes investment from Innovation Investment Capital Ltd Partnership, backed by Cardiff Capital Region, Gaingels, SpaceVC, Unruly, with additional contributions from Helium Three, Stellar and TypeOne, and London Technology Club.

"This is great news for the UK's space industry, and a vote of confidence in the cutting-edge advanced manufacturing technology Space Forge is pioneering in Wales," reckons Industry Minister Sarah Jones. "Our modern Industrial Strategy will drive growth in these sectors even further, giving businesses the confidence they need to commit to investing in the UK and ensuring we remain a partner of choice for space agencies around the world," she adds.

"This landmark investment in Space Forge is a powerful vote of confidence in the UK's growing space economy," says Dr Paul Bate, CEO of the UK Space Agency. "Based in South Wales, Space Forge exemplifies how cutting-edge space technology is thriving across all corners of the UK. By transforming the way we manufacture high-performance materials, Space Forge is not only pushing the boundaries of what's possible in orbit, but will also deliver real-world benefits on Earth — from cleaner energy to more secure supply chains."

With key industry collaborations underway — including partnerships with Sierra Space and Northrop Grumman — Space Forge is poised to lead the commercialization of in-space manufacturing from low Earth orbit (LEO).

www.spaceforge.com

Micro-gravity manufacturing firm Space Forge to be CISM's first incubation client

Swansea University's Centre for Integrative Semiconductor Materials to enable terrestrial scale-up

Swansea University has signed a deal that makes Space Forge Ltd of Cardiff, South Wales, UK (which is pioneering space-based advanced materials manufacturing via fully returnable satellites) the first firm to be physically hosted in the Centre for Integrative Semiconductor Materials (CISM), where it will undertake work on manufacturing in micro-gravity. Space Forge will be CISM's first incubation client with a dedicated cleanroom incubation bay and access to a full suite of semiconductor processing and characterization tools.

Space Forge is making high-value semiconductor products derived from semiconductor seed wafers grown in microgravity. At CISM, they will begin to develop their terrestrial scale-up capability, focusing on radiation-hard wide-bandgap power electronics material — such as silicon carbide (SiC), gallium nitride (GaN), gallium oxide (Ga_2O_3) — and microgravity growth-tool development.

As the UK's newest semiconductor research, development and innovation facility, CISM represents a £55m investment by the UK and Welsh Governments and is uniquely designed for pilot-scale translation to manufacturing and start-up incubation.

To date, CISM has focused on clean energy, efficient power and microelectronics, semiconductors in healthcare, and over-the-horizon semiconductors. This new agreement marks an expansion into the development of semiconductor technology for space applications.

CISM is part of the CSconnected semiconductor ecosystem in South Wales, Europe's first cluster for compound semiconductor manufacturing and innovation, which includes multi-national firms such as Vishay, Microchip, KLA and IQE, alongside a growing community of SMEs and start-ups like Space Forge. It is supported by innovation from Swansea University and Cardiff University, the Compound Semiconductor Application (CSA) Catapult, the Compound Semiconductor Centre (CSC), and is coordinated by CSconnected.

The Centre for Integrative Semiconductor Materials (CISM) at Swansea University.

"Incubation of innovative SMEs and start-ups is part of our core mission," notes CISM's director professor Paul Meredith. "Space Forge will benefit from full access to our state-of-the-art fab but also be immersed in a vibrant community of semiconductor researchers, companies, innovators and entrepreneurs. We hope the outstanding facilities and intellectual environment at CISM will help grow the Space Forge business faster and smarter to market," he adds.

At CISM, they will begin to develop their terrestrial scale-up capability, focusing on radiation-hard wide-bandgap power electronics material and microgravity growth-tool development

"This partnership provides Space Forge with the critical infrastructure needed to advance our work in space-based manufacturing and terrestrial scale-up," reckons Dr Alastair McGibbon, head of semiconductors at Space Forge. "With full access we're now in an even stronger position to drive innovation."

www.spaceforge.com
www.swansea.ac.uk/science-and-engineering/research/semiconductors
www.csconnected.com

Applied Materials and CEA-Leti expand joint lab to drive innovation in specialty chips

Collaboration focuses on materials engineering solutions to enable more energy-efficient AI data centers

Process equipment maker Applied Materials Inc of Santa Clara, CA, USA and micro/nanotechnology R&D center CEA-Leti of Grenoble, France have announced the next phase of their longstanding collaboration to accelerate innovation in specialty semiconductors. Through an expansion of their joint lab, the organizations plan to develop materials engineering solutions to address emerging infrastructure challenges in AI data centers.

The joint lab is focused on device innovations for chipmakers serving ICAPS markets (IoT, Communications, Automotive, Power and Sensors). Such specialty chips are used in a range of applications — from industrial automation to electric vehicles — and they play a critical role managing data and power distribution within data centers. Growing resource demands in AI infrastructure have highlighted the need for a new wave of innovation in ICAPS chips to enable more energy-efficient computing.

Under the new agreement, Applied and CEA-Leti will expand the lab with new equipment and capabilities that move beyond individual process steps to include full-flow development of specialty devices. Additionally, the lab will be equipped with advanced packaging tools to support heterogeneous integration of chips across different wafer types and process nodes — enabling entirely new classes of specialty devices for a range of next-generation applications.

CEA-Leti and AMAT signing ceremony.

The joint facility features several Applied Materials wafer processing systems together with CEA-Leti's capabilities for evaluating performance of new materials and device validation. The upgraded lab should strengthen the chipmaking ecosystem in France by further expanding the technology hub in Grenoble, a site for collaborative innovation across government, academia and industry. The lab also marks an extension of Applied's global EPIC Platform, a new high-velocity innovation model designed to accelerate commercialization of new chip technologies. Applied and CEA-Leti will be able to leverage the R&D work taking place across Applied's global innovation centers to drive progress in specialty semiconductor technologies.

"Applied Materials and CEA-Leti have a long history of successful collaboration, and we are excited to strengthen our capabilities for accelerating innovation and commercialization of next-generation specialty chips," says Aninda Moitra, corporate VP & general manager of Applied Materials' ICAPS business. "Our combined expertise will help foster breakthroughs and push the boundaries of semiconductor innovation, contributing to sustainable advancements in a range of critical applications for the AI era."

The first phase of the expanded collaboration laid important groundwork for addressing materials-engineering challenges of specialty semiconductor devices, notes CEA-Leti's CEO Sébastian Dauvé. "Building on this momentum, the joint lab's new focus on energy-efficient solutions for AI data-center infrastructure reflects our shared commitment to making technological progress that meets both industrial and societal needs," he adds. "The extended partnership also leverages our complementary strengths to accelerate innovation at the system level, while supporting sustainable growth in France's semiconductor ecosystem."

www.leti.fr
www.appliedmaterials.com/us/en/semiconductor/markets-and-inflections/icaps.html

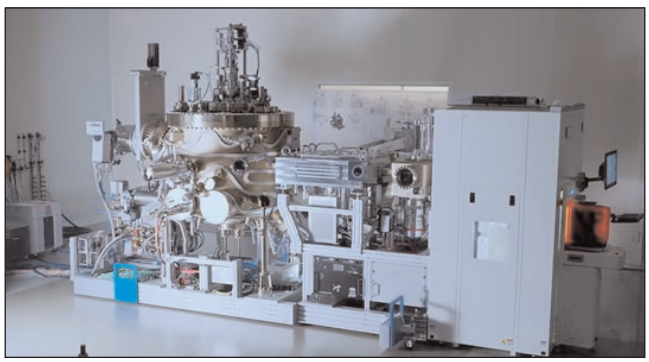
Riber partners with Denmark's NQCP, initiating phase II of ROSIE

Riber Oxide Silicon Epitaxy process to be qualified on first 300mm system for photonics compatible with silicon fabs

Molecular beam epitaxy (MBE) system maker Riber S.A. of Bezons, France has signed a three-year collaborative partnership with the Denmark-based Novo Nordisk Foundation Quantum Computing Programme (NQCP), a research initiative launched by the Novo Nordisk Foundation in collaboration with the Niels Bohr Institute at the University of Copenhagen.

The program aims to develop a fault-tolerant quantum computing (FTQC) hardware and quantum algorithms that solve complex life-science problems. Leveraging a global network of academic and industrial partners, NQCP takes an interdisciplinary approach, exploring multiple qubit technologies to identify the most promising platform. The program also includes the creation of the Quantum Foundry Copenhagen, a facility dedicated to new manufacturing processes for high-precision quantum components, essential for the future generation of quantum computing processors.

The partnership is a milestone in Riber's aim to become an integral part of silicon fab production lines. It focuses on industrial qualification of ROSIE (Riber Oxide Silicon Epitaxy), a platform specifically designed for oxide growth on 300mm wafers and fully compliant with SEMI standards.



ROSIE targets several strategic markets:

- ultra-fast optical communications, particularly the datacom/telecom segments;
- optical computing;
- photonic quantum technologies.

First ROSIE system sold

The partnership includes the sale of the first ROSIE unit to NQCP, with delivery scheduled for second-half 2025. The system will be integrated into a pilot line dedicated to photonic technologies. The program involves joint development work to optimize the process, which will be standardized in the equipment to enable rapid production ramp-up and fast-track achievement of the productivity levels expected by customers.

French-born platform supported by France 2030 to tackle global silicon industry challenges

Developed since 2021, ROSIE combines MBE expertise with full compatibility with the industrial requirements of silicon production lines. The project has received support from the Île-de-France Region through the Innov'Up program and from Bpifrance under the France 2030 investment plan.

Collaboration

"The scientific environment, the team's outstanding expertise, and their enthusiasm were decisive in our decision," comments Dr Jean-Louis Guyaux, chief technology officer of Riber Lab.

"Our partnership with a leading European lab in integrated silicon photonics is a strategic lever to accelerate the development of innovative processes," says chairwoman & CEO Annie Geoffroy. "This collaboration will help us better meet growing market demands for performance, miniaturization and energy efficiency, while also strengthening our capacity for innovation," she adds. "This collaboration launches Phase II of the ROSIE journey – industrialization."

www.riber.com
https://nqcp.ku.dk

Riber wins order from Asia for MBE 412 research system

System to aid research on 1650nm laser sources for methane detection

Riber has sold an MBE 412 research system to a leading Asian university institute, to support research on laser sources emitting at a wavelength of 1650nm, for application in methane detection.

The system will be dedicated to the study of gallium arsenide (GaAs)- and indium phosphide (InP)-based materials, with the objective of exploring new growth processes to optimize strained heterogeneous and multi-layer structures, improving the performance of optoelectronic devices in critical applications.

The compact, versatile MBE 412 is said to have high flexibility in growth protocols, enabling the implementation of complex processes due to its compatibility with a wide range of effusion cells, while ensuring excellent deposition uniformity and stability, it is claimed.

The new order highlights the growing interest among research institutes in MBE technologies for the development of specialized lasers and innovative nanoscale materials, says Riber.

National Research Council of Canada signs MoU with Quebec's C2MI and UK's CSA Catapult

Strategic partnership strengthens Canadian and UK supply chains for growing AI compute capacity

Together with UK-based Compound Semiconductor Applications (CSA) Catapult and Quebec-based MiQro Innovation Collaborative Centre (C2MI), the National Research Council of Canada (NRC) has put in place a memorandum of understanding (MoU) to deepen connections and grow a strong and resilient semiconductor supply chain for Canada, the UK, and other G7 countries.

Over the next three years, the MOU aims to align each partner's capabilities in designing, fabricating and packaging semiconductors. The collaboration is about creating a strong value chain between Canada and the UK, and should smooth the path from development to production.

As well as powering military defence equipment, radar detection systems, high-performance computing, telecommunications, satellites and sensing, semiconductors are also essential for building AI data centers in Canada that are more energy efficient while ensuring sensitive and private information remains in Canada. Semiconductors are expected to continue to be critical for driving future economic growth in Canada, spurring innovation in emerging technologies such as quantum, and supporting efforts to attract and retain experts in strategic sectors in Canada.

"As Canada continues to strengthen ties with reliable partners, we are proud to partner with CSA Catapult and C2MI to strengthen the semiconductor industry both in Canada and the United Kingdom," states The Honourable Mélanie Joly, Minister of Industry and Minister responsible for Canada Economic Development for Quebec Regions. "This international collaboration is the first of many to ensure we build a strong Canadian economy," she adds.

"This partnership is a vital step toward building a strong and resilient semiconductor supply chain for Canada and our G7 partners," believes The Honourable Evan Solomon, Minister of Artificial Intelligence and Digital Innovation and Minister responsible for the Federal Economic Development Agency for Southern Ontario. "Semiconductors are the backbone of our digital future, powering everything from AI data centers to defence systems… This partnership will accelerate innovation, secure sensitive data within our borders, and position Canada as a global leader in advanced technology," he adds.

"The NRC's Canadian Photonics Fabrication Centre [North America's only end-to-end pure-play indium phosphide photonics foundry] has a long history of fabricating semiconductors to power the most modern telecommunications and data communications networks, including AI infrastructure," notes National Research Council of Canada president Mitch Davies. "Combining our strengths with those of our partners — CSA Catapult and the MiQro Innovation Collaborative Centre — positions our countries as global leaders in the development and commercialization of semiconductor devices," he adds.

"We look forward to establishing a long and mutually beneficial relationship between ourselves, the UK and Canada," says CSA Catapult's head Raj Gawera.

"Our expertise in accelerating the commercialization of semiconductor components will lead to supply chain stability for companies in the photonics market for both our countries," says C2MI's CEO Marie-Josée Turgeon.

https://nrc.canada.ca/en/research-development/nrc-facilities/canadian-photonics-fabrication-centre
www.c2mi.ca/en
www.ised-isde.canada.ca/site/ised/en/canadian-sovereign-ai-compute-strategy

ELENA project develops Europe's first LNOI substrates for photonic integrated circuits, completing supply chain

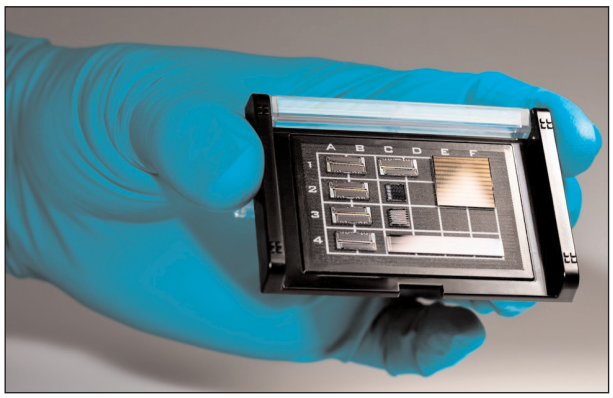
Open-access commercial LNOI photonic foundry CCRAFT created at Switzerland CSEM

Funded by the European Commission under the Horizon 2020 program as a collaborative research and innovation initiative (grant agreement n°101016138), the recently concluded 42-month project ELENA ('European electro-optic and nonlinear PIC platform based on lithium niobate') has developed the first European-made lithium niobate on insulator (LNOI) substrates for photonic integrated circuits (PICs), establishing a complete European supply chain for thin-film lithium niobate (TFLN) technology.

TFLN is a material platform that enables high-performance PICs through its thin-film structure, offering unique electro-optic, nonlinear optical, and acousto-optic properties. The advent of LNOI wafers allows micromachining of lithium niobate with high precision, integrating multiple optical functions within a footprint smaller than a fingertip. These attributes make LNOI particularly attractive for high-speed, low-power optical communications and quantum systems.

Until now, the LNOI ecosystem has been constrained by a limited supply chain reliant on a single commercial supplier outside the EU — and the absence of a commercial foundry capable of producing TFLN photonic chips at scale. The ELENA project directly addressed these critical gaps by establishing Europe's first commercial LNOI wafer supply and laying the groundwork for a TFLN photonic chip foundry.

The €5m initiative united 10 partners across the PIC value chain — from substrate innovation and photonic design to manufacturing, testing, and packaging. The partners, which include European research institutes, large industrial companies and SMEs, are:



- Swiss Center for Electronics and Microtechnology (CSEM), Switzerland;
- CEA-Leti, France;
- SOITEC SA, France;
- VPIphotonics GmbH, Germany;
- Eidgenössische Technische Hochschule Zürich (ETHZ), Switzerland;
- Vanguard Automation GmbH, Germany;
- Thales SA, France;
- III-V Lab, France;
- Rosenberger Hochfrequenztechnik GmbH & Co KG, Germany; and
- L-up SAS, France.

Key outcomes include the first process design kit (PDK) for the LNOI platform and advances in foundry-compatible processes to transition TFLN technology from research to commercial production. This effort is intended to significantly enhance European sovereignty in a strategically vital segment of the semiconductor supply chain.

Spinout launched to produce TFLN photonic chips on 150mm optical-grade wafers

A cornerstone of the project is the creation of Europe's first open-access LNOI photonic chip foundry at the CSEM's certified cleanroom facility in Neuchâtel. There, TFLN chips will be produced on 150mm optical-grade LNOI wafers at industrial scale. As a result, CSEM, which coordinated the project, has launched CCRAFT, a dedicated spin-out to scale up production.

"The spinout foundry is uniquely positioned at the core of the TFLN value chain, because it delivers production-grade service, a rare block in the supply chain," says Hamed Sattari, ELENA's project manager and CEO of CCRAFT. "CCRAFT's roadmap includes expanding capacity to deliver millions of TFLN chips annually, firmly positioning Europe as a global leader in photonic-chip manufacturing."

The availability of a production-grade photonic chip foundry, combined with project members CEA-Leti and SOITEC's plans to commercialize LNOI wafers, also supports Europe's ability to manufacture the next generation of photonic chips across a broad range of markets and industries.

Meeting diverse market needs with demonstrator prototypes

To validate the platform, ELENA produced four demonstrator PICs targeting high-impact sectors:

- Quantum: ion trapping, optical clocks, entangled photon generation;
- Telecom: >400Gb/s modulators, DWDM, CMOS-compatible transceivers;
- Space: lightweight, low-power PICs for satellite communications; and
- LIDAR/sensing: compact, efficient systems for automotive, medical, and environmental monitoring.

It is expected that, as demand surges for faster, energy-efficient electro-optic chips across AI, data centers, and telecommunications, ELENA's achievement will position the EU at the forefront of global photonics innovation.

www.csem.ch/en
www.ccraft.com
www.project-elena.eu

Cree LED sues NanoLumens over display products

Cree LED Inc of Durham, NC, USA (a Penguin Solutions brand) has filed a lawsuit in the United States District Court for the Northern District of Georgia asserting that NanoLumens Inc of Peachtree Corners, GA, USA has, by selling certain display products, infringed its rights in relation to the following US Patents 8049230, 9054257, 9831393, 7718991, 9240395 and D691100.

Cree LED says that its pioneering advances include the introduction of the industry's first IPX6/IPX8-rated surface-mount device (SMD) LEDs for displays, the development of high-contrast SMD LEDs, and the launch of proprietary FusionBeam Technology. The patented innovations have enabled bright, high-contrast displays that work reliably indoors and outdoors, supporting digital signage applications from live events to retail installations, the firm adds.

Cree LED says that it actively monitors the global market to identify unauthorized use of its patented technologies. This includes vigilance across the entire value chain, from manufacturers and suppliers to specifiers and end users of digital display systems.

"Protecting our intellectual property is essential to sustaining innovation and ensuring a level playing field," states Jesse Reiherzer, VP of Cree LED's High Bright business. "We will continue to take decisive action to defend our patents and uphold the integrity of our technology."

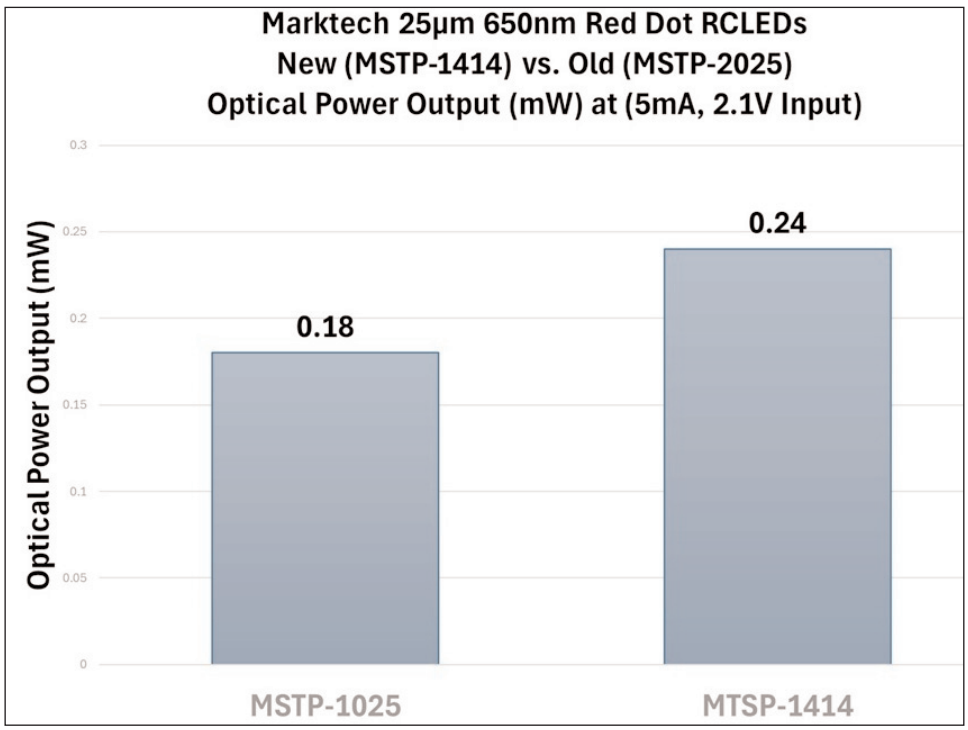
www.nanolumens.com
www.cree-led.com

Marktech unveils next-gen high-efficiency 25µm red dot RCLEDs for ultraprecise aiming with low power draw

Marktech Optoelectronics Inc of Latham, NY, USA, a vertically integrated designer and manufacturer of optoelectronics components and assemblies, has released its new high-efficiency 25µm-diameter resonant-cavity light-emitting diodes (RCLEDs) with a peak emission at 650nm, which it claims set a new benchmark for performance in precision optical targeting applications.

The latest 25µm-aperture 'Red Dot' RCLEDs deliver a 33% increase in optical output power compared with previous-generation devices under the same forward current and voltage conditions (I_f=5mA, V_f=2.1V), offering what is claimed to be industry-leading efficiency without sacrificing footprint or compatibility. Suiting battery-powered systems, the enhanced efficiency translates directly into longer operational life and superior beam clarity.

Available in two robust black surface-mount packages — a 2.1mm x 2.1mm-square SMD and a compact 1.5mm x 1.6mm SMD — the RCLEDs incorporate Marktech's proprietary black encapsulation technology. This advanced packaging eliminates internal reflections and optical defects, ensuring a crisp, well-defined circular point source suitable for the most demanding optical applications



Higher efficiency of the new-Marktech 25µm 650nm red-dot-LEDs.

"Our new high-efficiency 25µm red dot LEDs dramatically improve battery life while maintaining the sharpest, most precise point source in the industry," claims chief technology officer Vince Forte. "With virtually zero internal reflections and a well-defined beam profile, these RCLEDs provide an ultraclear aiming dot — critical for scopes, speed guns, pyrometers, viewfinders and finderscopes where accuracy and clarity are non-negotiable."

Marktech says its red dot emitters are trusted in industries ranging from defense and aerospace to sports optics, medical diagnostics, and instrumentation. With US-based manufacturing in Simi Valley, California, the components offer what is claimed to be unmatched quality, reliability, and traceability.

www.marktechopto.com/led-emitters/red-dot-reticle-leds

FBH exceeds 1mW far-UVC LED CW from single fiber

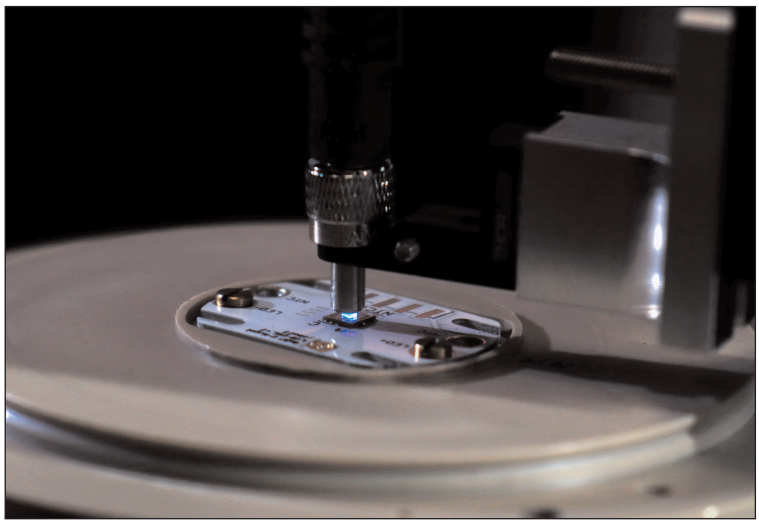
235nm UV micro-LED arrays target multidrug-resistant germs

Multidrug-resistant organisms (MDROs) are a major challenge in everyday medical practice, as they often cannot be treated with antibiotics. According to the Robert Koch Institute, there are 400,000–600,000 hospital-acquired infections in Germany annually, and 10,000–20,000 people die from them. Alternative treatments are therefore needed.

Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (FBH) of Berlin, Germany says that its light-emitting diodes (LEDs), which emit light in the far-ultraviolet (UV) spectral range of wavelengths below 235nm, are opening up new opportunities. Due to the high absorption at these wavelengths, the far-UVC is interesting for medical applications, as the light does not penetrate the living layers of the skin and therefore causes less damage than a sunburn. Far-UVC LEDs thus achieve what antibiotics do not always succeed in doing: killing harmful micro-organisms, especially MDROs, without developing resistance.

"With these very short-wave LEDs, we were able to demonstrate international record values in terms of efficiency and performance," says research group leader Dr Sven Einfeldt, who has many years of experience in the development of UVC LEDs for medical applications. "Together with partners, we now want to take the next step from the laboratory to practical application with a prototype."

FBH has already developed 233nm UVC LEDs and used them to construct panel irradiation systems that have been applied directly to human skin. Extensive studies conducted within two BMFTR-funded projects at Charité — Universitätsmedizin Berlin and Universitätsmedizin Greifswald — have confirmed the effectiveness of the treatment and that it does not cause any lasting damage to the skin.



Laboratory setup with far-UVC LED chip consisting of tens of thousands of 235nm micro-LEDs emitting into a glass fiber. © FBH/P. Immerz

Nasopharyngeal irradiation system to combat pathogens where they appear

However, these irradiation systems only reach affected areas on the outer skin. That is why the vision of the medical professionals was more ambitious during the tests. "Small LED irradiation sources with an output power of around 1mW that we can insert directly into the nose or throat would be ideal," says professor Martina Meinke, head of the Center for Skin Physiology at Charité's Department of Dermatology, Venereology, and Allergology.

"This would allow us to inactivate MDROs in their habitats, which have been difficult to reach until now. After disinfecting the entire body with special washing lotions and mouthwashes, it would be possible, for example, to completely eliminate MRSA bacteria."

Such a nasopharyngeal endoscope, which reduces germs within clinically relevant time frames, is no longer a distant vision. FBH has further developed its UVC LEDs so that they deliver the required output power. When integrated into an endoscope, the required irradiation times of about 5 minutes could be achieved without significant heat generation.

Record 235nm UVC LEDs for medicine and sensor technology

Due to the aluminium gallium nitride (AlGaN) material system that is used, far-UVC LEDs are technologically demanding and have not yet delivered the performance required for commercial applications. Driven primarily by the work of Dr Jens Rass, FBH has now succeeded for the first time in exceeding the important threshold of 1mW output power with far-UVC light in continuous wave (CW) operation from a single fiber — a record that was recently presented at a conference. This milestone opens up applications in antiseptics and sensor technology.

This was achieved using 235nm UV micro-LEDs arranged in a dense array. This allows five times more light to be coupled into the fiber than with conventional far-UVC LEDs. The micro-LEDs themselves, of which up to 125,000 are arranged on a chip measuring 1mm^2, are extremely compact, with diameters of only about 1.5µm. This not only allows more light to be coupled out of the individual chip but also makes it more directional and therefore very precise.

Due to their compact design and high performance, such fiber-coupled light sources would be suitable for eradicating multi-resistant germs and for disinfection in body cavities. The vision of a light source for disinfecting the nasopharyngeal cavity is thus within reach.

www.fbh-berlin.de

UIUC reveals 'efficiency cliff' when LEDs are scaled to submicron dimensions

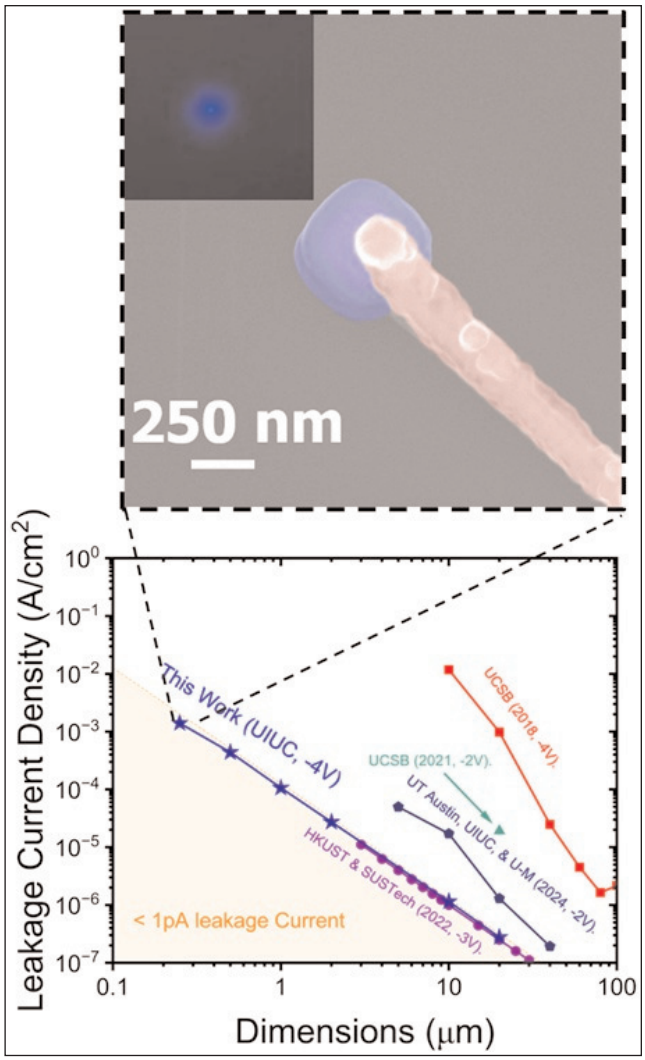
Peak external quantum efficiency stable from 20μm to 2μm but falls 70% down to 250nm

The University of Illinois Urbana-Champaign (UIUC) in the USA has fabricated blue light-emitting diodes (LEDs) down to an unprecedented 250nm in size, a critical step for next-generation technologies like ultra-high-resolution displays and advanced optical communication. However, their study reveals a significant challenge: a sharp 'efficiency cliff' when these LEDs are scaled to submicron dimensions (J. Lee, Y. C. Chiu, and C. Bayram, Applied Physics Letters 126, 242101 (2025).

Led by professor Can Bayram at the Department of Electrical and Computer Engineering and the Nick Holonyak Jr Micro and Nanotechnology Laboratory, the team employed a top-down fabrication approach using electron-beam lithography on QST substrates.

The resulting submicron LEDs, some as small as 250nm x 250nm, initially demonstrated promising electrical characteristics, including ideal forward voltage and remarkably low leakage current density. This suggested that the chemical treatments and passivation techniques used were effective in recovering sidewall damage from the etching process. But, despite these positive indicators, the study found a dramatic decrease — of about 70% — in peak external quantum efficiency (EQE) as the LEDs were scaled from 2μm down to 250nm. This 'efficiency cliff' is surprising, particularly as the EQE remained relatively stable for devices scaled from 20μm down to 2μm.

"The conventional sidewall passivation methods, which work well for micro-LEDs, are not sufficient when we push the dimensions into the submicron realm," says Bayram, an Intel Alumni Endowed Faculty Scholar and director of the Innovative Compound semiconductoR LABoratory (ICORLAB). "The issue appears to be that, as the LED mesa size becomes comparable to the distance carriers can diffuse laterally, the impact of the sidewalls and any associated non-radiative recombination becomes overwhelmingly dominant, even with current state-of-the-art passivation."



Top-down fabricated submicron LEDs (250nm dimensions) and (bottom) leakage current density benchmark with literature.

The research indicates that, at these ultrasmall scales, the proportion of the LED's active region affected by sidewall defects significantly increases. While the team achieved good recovery of sidewall damage, evidenced by low leakage currents, the standard passivation (an atomic-layer-deposited bilayer of aluminium oxide and silicon dioxide) could not sufficiently suppress surface recombination in these submicron devices.

This study underscores a critical hurdle for the practical implementation of top-down fabricated submicron LEDs. While the successful fabrication of 250nm LEDs with good electricals is a promising starting point, overcoming the efficiency cliff is paramount. "These results call for a fundamental rethinking of how we manage sidewall effects in these tiny light emitters," says Bayram. "Novel passivation strategies, potentially involving new materials or techniques to prevent lateral carrier diffusion, will be essential to unlock the full potential of submicron LEDs for future technologies."

The work was performed in the Micro and Nanotechnology Laboratory and Frederick Seitz Materials Research Laboratory Central Research Facilities at UIUC, funded in part by the Advanced Research Projects Agency-Energy (ARPA-E), US Department of Energy, under award number DE-AR0001558.
https://doi.org/10.1063/5.0257758
http://icorlab.ece.illinois.edu
https://443.ece.illinois.edu/

VueReal partners with distributor ACA TMetrix

Reference design kits and micro-LED evaluation platforms to be exclusively distributed across Canada

Micro-LED technology firm VueReal Inc of Waterloo, ON, Canada has announced a strategic partnership for its reference design kits (RDKs) and micro-LED evaluation platforms to be exclusively distributed across Canada by ACA TMetrix Inc (a Canadian distributor of high-tech test & measurement solutions), empowering engineering teams to accelerate the adoption of next-generation display technologies in key markets such as automotive, defense, and consumer electronics.

VueReal says that its core MicroSolid Printing platform for micro-LED and micro-semiconductor manufacturing solves critical challenges in yield, scalability and cost efficiency. By enabling the efficient transfer of millions of micron-sized LEDs with what is claimed to be industry-leading 99.999% yield, scalable throughput (2–5x faster than traditional methods), and up to 10x wafer utilization, VueReal claims that it is making advanced micro-LED displays commercially viable for a wide range of applications.

VueReal's Reference Design Kits: unlocking the potential of micro-LED

VueReal's RDKs are designed to help engineering teams evaluate and integrate micro-LED technology into their products more quickly and effectively. The kits include pre-configured micro-LED panels and evaluation platforms showcasing VueReal's ultra-high-brightness (up to 1,000,000nits), sub-5µm pixel pitch, and energy-efficient operation. The firm says that its RDKs enable rapid proof-of-concept development across industries ranging from automotive HUDs to AR/VR and wearable devices.

VueReal and ACA TMetrix aim to remove barriers to micro-LED adoption by offering:

- *Expanded market reach*: ACA TMetrix brings more than 65 years of experience in technical sales and distribution in Canada, expanding VueReal's footprint in key markets such as automotive, defense, education and consumer electronics.
- *Faster evaluation and adoption*: VueReal's RDKs will be easily accessible to engineering teams evaluating cutting-edge display technologies.
- *Rapid response*: Canadian customers benefit from ACA TMetrix's on-the-ground technical support team, which offers faster response times for troubleshooting and hands-on assistance. This localized support minimizes downtime, shortens implementation cycles, and ensures seamless integration of VueReal's micro-LED platforms into customer applications.
- *Trusted partner*: ACA TMetrix is a preferred distributor for several technology leaders in Canada, offering a strong foundation for trusted engagements.

VueReal's RDKs are enabling advances in:

- *Automotive*: High-brightness HUDs, instrument clusters, and smart lighting solutions.
- *Consumer electronics*: Energy-efficient wearables, AR/VR displays, smartphones, and transparent TVs.
- *Retail & defense*: Advanced lighting systems and tactical displays.

"This partnership directly addresses a major industry challenge — bridging the gap between micro-LED innovation and real-world adoption," says VueReal's chief commercial officer Robert Selley. "With ACA TMetrix's extensive distribution and support network, engineering teams can rapidly test and integrate micro-LED solutions into their designs. VueReal's MicroSolid Printing platform eliminates traditional yield and scalability barriers, making high-performance micro-LED displays commercially viable for industries demanding superior brightness, efficiency, and precision," he adds.

"VueReal's MicroSolid Printing platform addresses critical pain points in micro-LED and micro-semiconductor manufacturing, such as yield and cost efficiency," says ACA TMetrix's VP & general manager Patrick Leung. "By offering their RDKs and evaluation platforms, we're empowering our customers to accelerate their product development cycles and achieve faster time-to-market."

www.tmetrix.com
www.vuereal.com/rdk

BluGlass demos leading-edge precision in visible GaN lasers at ICNS-15

Improvements include expanded Fabry–Pérot laser wavelengths and multi-mode power conversion efficiencies of 43%, and 685kHz narrow-linewidth GaN DFB lasers

In an invited presentation on GaN distributed feedback (DFB) lasers and amplifiers for next-generation high-power devices at the International Congress on Nitride Semiconductors (ICNS-15) in Malmö, Sweden (11–17 July), BluGlass Ltd of Silverwater, Australia has unveiled performance enhancements to its gallium nitride (GaN) lasers, demonstrating "leading-edge" precision.

The advances are said to unlock key functionality for next-generation applications including quantum computing, secure communication, and wearable medical devices.

The demonstrated performance improvements include expanded Fabry–Pérot laser wavelengths and multi-mode power conversion efficiencies of 43% (QCW), representing a 16% year-over-year increase. BluGlass also presented leading 685kHz narrow-linewidth GaN DFB laser capabilities, providing enhanced application versatility where power, precision and tunability are required.

BluGlass has expanded its demonstrated single-mode wavelengths to include aqua-marine (488nm) and light green (504m), with true green wavelengths in development, extending its violet and blue GaN laser capabilities.

The firm is also collaborating with its Microelectronics Commons Commercial Leap Ahead for Wide Bandgap Semiconductors (CLAWS) Hub partner, North Carolina State University (NCSU), on advanced DFB modelling to fast-track design optimization and performance improvements.

"These improvements support our quantum, scientific and bio-tech customers, offering advanced precision and tunability in visible wavelengths," says BluGlass CEO Jim Haden. "Advancements in quantum computing and quantum applications are being underpinned by stimulated light interaction with unique materials, down to the atomic scale, requiring specific wavelengths, and tunability to target individual atomic interactions. Our amplified single-chip designs further enable customers to combine precision and high power, unlocking next-generation applications," he adds.

"BluGlass' compact DFB lasers have the potential to pave the way for secure quantum communication networks — a significant opportunity, given the broader global quantum application market is forecasted to reach US$125bn by 2030," continues Haden. "Our collaboration with NCSU is accelerating our development in this domain, enabling us to leverage the world-class skills, capability and expertise of our Microelectronics Commons partner.

"Due to their unique performance properties, visible laser sources will also enable advancements in aerospace, underwater ranging and communication, and next-generation biotech and wearable technologies," Haden concludes.

www.bluglass.com.au

BluGlass closes share purchase plan, raising extra $5.3m

Funds to be used to fulfil new and existing contracts, additional fab equipment, and working capital

BluGlass Ltd of Silverwater, Australia — which develops and manufactures gallium nitride (GaN) blue laser diodes based on its proprietary low-temperature, low-hydrogen remote-plasma chemical vapor deposition (RPCVD) technology — has closed its share purchase plan (SPP), raising $5.3m before costs. The SPP followed a $2.3m placement to institutional and sophisticated investors at the beginning of May, raising a total of $7.6m.

Funds will accelerate production and delivery of the firm's visible GaN lasers, fulfilling new and existing contracts, as well as support extra fab equipment and working capital. BluGlass says that it has a robust pipeline with 26 active projects in various stages of negotiation, collectively valued at US$90–100m.

The SPP enabled eligible shareholders to subscribe for up to $100,000 of new BluGlass shares at $0.00975, representing a 2.5% discount to the 5-day volume-weighted average price (VWAP) of BluGlass shares prior to the SPP closing date of 18 June. The offer included one free attaching option exercisable at $0.013 and expiring on 31 May 2026 or 30 days from the date on which the firm announces a contract win from a tier-1 company for a total contract value of greater than $3m. Every attaching option exercised will include an additional piggyback option, exercisable at $0.019 and expiring 31 May 2028.

"This capital is instrumental to our continued growth, facilitating capabilities that underpin our world-class laser performance while providing a funding runway as we convert our growing project pipeline into large-scale, long-term revenues. These discussions and negotiations continue to progress as we work with key industry partners to design-in BluGlass lasers in next-generation quantum, aerospace and defence applications," says CEO Jim Haden.

This capital is instrumental to our continued growth, facilitating capabilities that underpin our world-class laser performance while providing a funding runway as we convert our growing project pipeline into large-scale, long-term revenues

"We appreciate the continued support from our loyal shareholders, underscoring confidence in our strategic execution, the strength of our industry partnerships — including with the US Department of Defense and, more recently, the Indian Department of Defence — and the significant potential of our high-performance laser technology in enabling next-generation applications," Haden continues. "The strength of our pipeline reaffirms our project-to-product strategy is the surest path to delivering long-term shareholder value."

Allotment of new shares was expected to occur on or around 24 June to allow international funds settlement with the issue of 545,639,233 fully paid ordinary shares. The issue of attaching options received shareholder approval at an extraordinary general meeting on 13 June.

www.bluglass.com.au

BluGlass to supply Indian Department of Defence with GaN lasers

Firm secures first order from Solid State Physics Laboratory

BluGlass is now an approved supplier and has received its first order from the Indian Ministry of Defence's Solid State Physics Laboratory (SSPL) worth $230,000 for development services for benchmarking the fabrication process of GaN-based laser diodes.

"BluGlass is continuing to strengthen our strategic partnerships with government agencies and defence primes around the world," notes CEO Jim Haden. "BluGlass was selected due to our ability to solve our customers' most complex problems and expertise in developing high-performance GaN laser technology for next-generation applications," he adds.

"India, poised to become one of the world's largest economies, is strategically advancing its technological capabilities by integrating cutting-edge lasers and photonics. GaN lasers offer compact performance, higher photon energy, and improved temperature stability, making them ideal for underwater and atmospheric LiDAR applications, countermeasures and jamming systems, communications, and quantum sensing and computing," Haden continues.

"BluGlass' vertically integrated capabilities and focus on delivering custom solutions ensures our strategic allies and partners access to advanced laser technology with strategic supply chain advantages."

www.bluglass.com.au

NUBURU reports progress in acquisition of Tekne as part of Defense & Security Hub

Tekne's 'Tactical Bubble' expected to generate over €50m in revenue

NUBURU Inc of Centennial, CO, USA — which was founded in 2015 and develops and manufactures high-power industrial blue lasers — has reported progress in its strategic transformation, including developments within its planned Defense & Security Hub and key acquisitions.

The regulatory approval process for the acquisition of Tekne SpA currently under review through Italy's Golden Power process is progressing positively and in line with expectations. The firm's team is working with the relevant Italian authorities, and current indications suggest a favorable outcome. Meanwhile, Tekne remains focused on its delivery plan, supporting, among its portfolio of clients, the Italian Ministry of Defense with pivotal technological solutions, with reference to its 'Tactical Bubble' systems, which are currently in full deployment.

"The Tactical Bubble is a next-generation battlefield system developed by Tekne and recognized by the Italian Armed Forces. It enables real-time communication, decision-making, and data sharing among military units, dramatically improving situational awareness and personnel safety in hostile environments," says Alessandro Zamboni, executive chairman. "This confirms that the targeted acquisition of Tekne will be a cornerstone of NUBURU's broader Defense & Security Hub strategy, which also includes the acquisition of a start-up Software-as-a-Service (SaaS) platform designed to enhance operational resilience across critical infrastructure and defense networks," he adds.

Designed to counter modern threats including hostile drones, cyber attacks, and electromagnetic warfare, the Tactical Bubble features integrated monitoring, identification, and countermeasure capabilities. It also establishes a robust, secure command-and-control network that supports fast, reliable mission execution in complex combat scenarios.

Tekne's €50m defense project under full deployment

Tekne continues to execute on its multi-phase contract with the Italian Ministry of Defense, focused on delivering its advanced Tactical Bubble systems, which are now fully operational. This project — expected to generate over €50m in revenue — was recently showcased during military exercises, including Stella Alpina and Scudo 25, and is central to Italy's defense modernization efforts.

Strengthening position in defense-tech and operational resilience

NUBURU views the delivery of the Tactical Bubble system as validation of its strategy to expand into defense-tech, homeland security, and operational resilience sectors. These high-growth verticals are key to the group's broader transformation plan, which can also leverage its leadership in high-performance laser applications into adjacent markets with long-term value potential.

In parallel, NUBURU is moving forward with completing the due diligence and US GAAP/IFRS audit processes related to Tekne and the SaaS startup transaction. Both deals remain subject to customary regulatory review and stockholders approval.

Commitment to growth, innovation, and shareholder value

NUBURU says that it continues to invest in R&D to study the application of exponential technologies, like artificial intelligence (Agentic AI), and the business' synergies with the fintech solutions, by leveraging the recent strategic investment in the inventory monetization platform powered by Supply@ME Capital Plc. Under the direction of Zamboni, NUBURU says it is committed to executing its long-term transformation strategy, driving sustained growth through strategic partnerships, product innovation, and acquisition-led expansion.

www.teknespa.it
www.nuburu.net

NUBURU accelerates M&A strategy with $100m flexible growth capital

NUBURU Inc of Centennial, CO, USA — which was founded in 2015 and develops and manufactures high-power industrial blue lasers — entered into a standby equity purchase agreement on 30 May with YA II PN Ltd under which it has the option, subject to certain conditions, to sell up to $100m in shares. This facility provides NUBURU with the financial flexibility to execute controlled stock sales until 30 May 2028. Joseph Gunnar & Co LLC acted as the sole placement agent for the private placement.

The agreement allows NUBURU to sell shares worth up to $100m at its discretion, based on market conditions and the firm's evolving needs. NUBURU maintains full authority over the timing and quantity of any share sales, ensuring strategic control over its funding operations and empowering it to dictate the pace and volume of equity sold, aligning sales strategies with operational goals. Certain conditions, including an effective registration statement, must be satisfied before the firm can make any sales under the agreement.

The purchase price for equity sales will be 97% of the lowest daily volume-weighted average price (VWAP) of the common shares over the three trading day period following the company's submission of a sale notice to the investor.

Proceeds from any stock sales under this agreement are intended for general corporate purposes, including working capital and growth initiatives, consistent with NUBURU's strategic commitments outlined in its transformation plan. In line with these growth ambitions, the firm recently disclosed its plan to acquire a controlling interest in TEKNE S.p.A., pending regulatory and stockholder approval.

"This funding facility not only provides us with the necessary capital to accelerate our growth ambitions but also strengthens our focus on transformative acquisitions, part of the capitalization plan recently submitted to NYSE," notes NUBURU's executive chairman Alessandro Zamboni.

TEKNE is known for its capability to unify advanced electronics and special-purpose vehicle engineering under one roof to deliver fully integrated, mission ready, high-performance systems. Its core strength lies in the expertise of its engineering department, with roots in the division it acquired from Thales in 2016. TEKNE conducts operations globally and has established commercial and support operations in the USA, including its strategic partnership in 2024 with US-based Flyer Defense, a provider of tactical ground mobility solutions. Together, TEKNE and Flyer Defense have announced plans to produce the Flyer 72-Heavy Duty vehicle, designed for rapid deployment across diverse military operations. This collaboration aims to enhance the capabilities of the Italian armed forces and its NATO allies, including US armed forces, fostering an environment of interoperability and readiness. TEKNE's board of directors aims to further enhance its governance and strategic support by appointing senior advisers with a background in serving the US armed forces. Leveraging this expertise, TEKNE intends to expand its presence in the US market, including plans to establish a technology laboratory focused on addressing specific US defense-tech needs.

www.nuburu.net

NYSE American accepts plan to regain listing compliance

NYSE American LLC has accepted NUBURU's plan to regain compliance with continued listing standards, granting an extension through 29 October 2026.

On 29 April, NYSE American notified NUBURU of non-compliance with Section 1003(a)(i) of the NYSE American Company Guide due to a stockholders' deficit of $37.8m as of end-December 2024, and losses in the two most recent fiscal years. After a review of NUBURU's 29 May plan and financial projections, NYSE Regulation has approved the plan, allowing NUBURU to continue its listing while executing key initiatives, including:

- *Strategic acquisitions*: Advancing the Defense & Security Hub initiative (which includes the Tekne strategic investment and the acquisition of a Software as Service' business in the space of operational resilience), leveraging Tekne's €50m product roadmap, including the Tactical Bubble defense products for secure command-and-control networks, currently deployed in Italian military exercises.
- *Debt recapitalization*: Strengthening the firm's financial position by addressing outstanding preferred stock liabilities and key vendor obligations, enhancing investor attractiveness.
- *Funding the new market positioning of the blue laser business unit:* supporting the go-to-market of NUBURU's high-performance blue laser technology alongside strategic partnerships and the focus on the defense sector, to drive long-term sustainable growth of such business line.

"This NYSE approval is a critical step in our transformation journey," says executive chairman Alessandro Zamboni.

Coherent launches 18W 880nm single-emitter laser

SES18-880A-190-10 is designed specifically for high-performance diode-pumped solid-state laser systems

Materials, networking and laser technology firm Coherent Corp of Saxonburg, PA, USA has launched the SES18-880A-190-10, a high-power 880nm single-emitter laser diode on sub mount, designed specifically for high-efficiency, high-reliability pumping of diode-pumped solid-state (DPSS) lasers.

Delivering 18W optical output power with over 62% conversion efficiency and 97% polarization extinction ratio, the SES18-880A-190-10 sets a new benchmark for DPSS pump lasers in terms of performance, reliability, and cost-effectiveness. With a 190µm emitter and one of the most competitive $/W ratios available in the 880nm class, this product is suitable for precision applications requiring excellent beam quality and scalable power.

"The DPSS laser market is evolving rapidly, with demand growing in micromachining, advanced packaging, and semiconductor processing," says Dr Karlheinz Gulden, senior VP, Laser Components and Subsystems at Coherent. "This new diode allows customers to realize the full benefits of 880nm pumping — delivering lower quantum defects, reduced thermal lensing, and enhanced mode quality compared to traditional 808nm solutions."

Built on the 6-inch GaAs wafer platform from Coherent, the SES18-880A-190-10 benefits from fully vertically integrated manufacturing, from epitaxial wafer growth to chip design and sub mount packaging. Its advanced chip architecture ensures consistent performance, high polarization purity, and robust thermal management, making it a standout option for end-pumped DPSS systems. Its wavelength range (870–876nm) and optimized front facet reflectivity are engineered for compatibility with volume Bragg grating (VBG) stabilization, offering precise wavelength control and alignment flexibility.

This new diode allows customers to realize the full benefits of 880nm pumping: lower quantum defects, reduced thermal lensing, and enhanced mode quality

Variations of the product are available at 878nm, 885nm and 888nm to support different DPSS gain media. Coherent also offers fiber-coupled modules using the same chip technology, supporting a wide range of integration needs. These modules, including the FACTOR series, provide scalable, high-efficiency pumping for advanced laser systems.

The SES18-880A-190-10 is generally available.

www.Coherent.com

Coherent launches compact, air-cooled 500W diode laser system

COMPACT EVOLUTION AC targeted at polymer welding

Materials, networking and laser technology firm Coherent Corp of Saxonburg, PA, USA has launched the COMPACT EVOLUTION AC, a next-generation compact, air-cooled 500W diode laser system for polymer welding.

Compatible with existing diode laser processing heads, the new system is said to offer superior performance and convenience for a wide range of industries including precision manufacturing, semi & display capital equipment and instrumentation.

Engineered for performance and ease of use, the COMPACT EVOLUTION AC features a 300µm fiber and turnkey operation, supporting critical applications such as polymer welding, soldering, heat treatment, and laser-assisted bonding. Its air-cooled thermal management eliminates the need for external water cooling, making it well suited for high-humidity environments and streamlined product lines.

Delivering up to 500W of cw output in a compact rack-mountable (19", 5HU) form factor, the system introduces greater flexibility and simplifies integration for OEMs seeking efficient, high-power diode laser solutions.

"This system is a game-changer for polymer welding, offering unparalleled convenience, efficiency, and power in a compact, air-cooled design," says Dr Karlheinz Gulden, senior VP, Laser Components and Subsystems at Coherent. "It will enable new levels of productivity and expand the possibilities for our customers in diverse industries."

The COMPACT EVOLUTION AC is generally available and suitable for both new installations and retrofit applications.

Coherent showcased the COMPACT EVOLUTION AC at LASER World of Photonics 2025 in Munich, Germany (24–27 June).

www.world-of-photonics.com
www.coherent.com/lasers/diode/compact-series

SuperLight unveils source for high-speed spectroscopy

SuperLight Photonics has unveiled the SLP-1050 compact, high-performance light source, purpose-built for demanding high-speed measurement applications.

Many spectroscopy systems use halogen light sources, which couple poorly into optical fibers, resulting in significant power loss. To compensate, they require long integration times, making them unsuitable for fast-paced industrial or medical applications. Wideband lasers offer far more efficient fiber coupling, delivering significantly higher brightness than halogen sources. However, traditional wideband lasers suffer from spectral instability, which often requires averaging across thousands of pulses. This again limits their use in high-speed industrial environments where real-time performance is critical.

Designed to transform spectroscopy in production environments, SuperLight's latest solution delivers what are claimed to be exceptional results compared with traditional light sources. Its spectral stability is unprecedented relative to legacy supercontinuum lasers, and its brightness outclasses halogen-based alternatives. The combination of high sensitivity, short integration times and a miniaturized, portable form factor enables rapid inline spectroscopy analysis.

"Our technology delivers an alternative light source to traditional halogen and laser-based spectroscopy systems," says chief commercial officer Jeroen Biesterbos. "By combining exceptional spectral stability, high brightness, and a compact form factor, we enable real-time, inline testing and analysis, bringing high-performance spectroscopy directly to the production line for demanding industrial applications."

SuperLight says that key advantages of the SLP-1050 wideband light source include:

- fast, real-time measurements to support high-throughput industrial processes;
- improved spectral stability by an order of magnitude versus legacy supercontinuum sources;
- the Class IIIb laser enables use in manufacturing environments with minimal safety requirements, allowing operation by non-specialist personnel;
- effortless integration for easy adoption in OEM and industrial setups;
- compact design optimized for space-constrained setups and integration into portable or mobile instruments;
- suitable for inline spectroscopy, ensuring process control without interruption.

SuperLight reckons that its new generation of wideband light source is set to drive higher quality-control standards in sectors such as semiconductors, pharmaceuticals, food and beverage, and materials manufacturing.

www.superlightphotonics.com/

SuperLight partners with ProCareLight for Iberia

SuperLight Photonics of Enschede, the Netherlands has announced a partnership with ProCareLight, a spin-off of Instituto de Ciencias Fotónicas (ICFO) that specializes in photonics, lasers and laser safety in Spain and Portugal.

Driven by a strong foundation in research and a growing ecosystem of innovative companies, Spain is emerging as a dynamic player in the European photonics landscape, comments SuperLight. With institutes like ICFO and increasing industrial demand for advanced optical technologies, the region offers fertile ground for photonics-driven applications, it adds.

By strengthening its presence in this market, SuperLight reckons that it is well positioned to support leading-edge innovation and meet the growing demand for high-performance laser solutions across Spain and Portugal.

"Supercontinuum lasers can be considered a mature technology, with a fair number of relevant manufacturers for laboratory applications," comments ProCareLight's s ales & marketing director Juan Luis Vadillo. "But somehow there was still a gap between the existing products and the industrial adoption of this technology due to size and price, especially in imaging and sensing applications like OCT, machine vision or quality inspection. SuperLight Photonics' technology is going to change the rules and allow the integration of white lasers at industrial scale," he adds.

"Spain is one of the European photonics hotspots. It is home to leading research institutions and universities, and it is on the rise with growing industry traction, and supportive infrastructure, making it a strategic market for photonics expansion," says SuperLight's chief operating officer Jeroen Biesterbos. "There is a steady rise in photonics-based startups and SMEs, especially in applications like medical imaging, sensors, renewable energy, and optical communications. By combining SuperLight Photonics' leading-edge laser technology with ProCareLight's regional knowledge and strong customer relationships, we aim to accelerate adoption and create lasting value in this growing photonics market."

With ProCareLight's established network and industry expertise, SuperLight will be able to offer its laser technologies to a wider range of industries, including semiconductor manufacturing and ultra-precise material processing, advanced metrology, (bio-) medical applications, and scientific research.

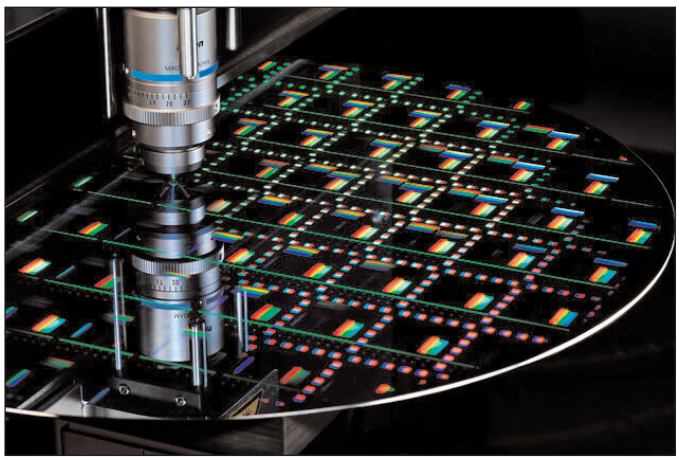
TU/e establishes new research institute for semiconductors, quantum photonics & high-tech systems

Technical University of Eindhoven to take lead in bolstering Dutch and European technological sovereignty

Technical University of Eindhoven (TU/e) in The Netherlands is establishing a new research institute dedicated to semiconductors, quantum, photonics, and the development of high-tech systems and chips of the future.

The new institute merges one existing institute with two initiatives: the Eindhoven Hendrik Casimir Institute (EHCI), the High Tech Systems Center (HTSC), and the Future Chips Flagship (FCF). These will be fully integrated into the new institute, which will continue, connect and deepen their work within the broader strategic direction of the university.

The aim aligns directly with recent policy initiatives such as the European Chips Act and the Draghi-report. Both underscore the importance of Europe retaining control over the development, production and application of key technologies that will shape the decades to come.



TeraNova measurement system inspecting a wafer used to make lenses and optical structures. Photo: Bart van Overbeeke.

Leading role in advanced technology

Europe is currently heavily reliant on non-European players for chips, high-tech production equipment, and critical raw materials. This leaves the continent vulnerable to geopolitical tensions and disruptions in supply chains. There is also the risk of losing influence over technological standards and ethical frameworks in areas such as AI, energy efficiency, data storage, resource scarcity, and sustainable production. With the launch of this new institute, TU/e is directly contributing to Europe's ambition to maintain a leading position in high-end technology.

"The rapidly shifting geopolitical landscape, both globally and within Europe, demands decisive action from all European actors. A strong research and innovation system is essential to safeguarding our continent's competitiveness," says Silvia Lenaerts, TU/e's rector magnificus. "Chips and high-tech systems are far more than just engines of digital innovation. They are key to our economic strength, geopolitical resilience, and global sustainability."

Single, recognisable point of contact

The new institute brings together more than 700 researchers working in chip technology, high-precision equipment, advanced materials and processes, and the fundamental science underpinning these fields. Researchers from the connected disciplines are expected to be able to find each other more easily, share insights more readily, and collaborate more effectively across disciplinary boundaries.

By consolidating research in emerging technologies under one roof, TU/e says that it offers a single, recognisable point of contact in these domains. For researchers in the Netherlands and abroad, the institute is expected to become the go-to destination for knowledge exchange and collaboration.

The institute is also expected to accelerate the translation of scientific insights into innovative applications. Through startups, spin-offs and industry partnerships, technological breakthroughs should find their way to society more quickly, solidifying TU/e's role as a key player in the European innovation landscape, from AI and climate solutions to healthcare, digital industry, and complex systems engineering.

Expansion of educational programs

"Thanks to our leading research and unique position in the Brainport region, TU/e is perfectly positioned to take the lead in driving sustainable digital innovation," reckons Lenaerts. "This new institute pools knowledge and talent to push technological boundaries, while strengthening Europe's resilience and autonomy in a world that seems less predictable than it once was."

As part of the Beethoven program, TU/e is also significantly expanding its educational offerings in the semiconductor field to tackle one of the sector's greatest challenges: the shortage of skilled talent.

Four core domains

The institute will organise its research across four core domains that together span the entire innovation ecosystem, from fundamental science to industrial application. The domains are closely interlinked, and researchers affiliated with the institute are actively encouraged to collaborate across disciplinary boundaries.

www.tue.nl/en/research/

PhotonDelta and Luminate NY collaborate on transatlantic growth network for photonics startups

Industry accelerator PhotonDelta of Eindhoven, the Netherlands (which connects and collaborates with an ecosystem of photonic chip technology organizations worldwide) and Luminate NY of Rochester, NY, USA (the world's largest accelerator for startups working on optics, photonics and imaging-enabled technologies) have entered into a strategic collaboration to support the growth of early-stage photonics companies across North America and the Netherlands.

The partnership brings together the two photonics ecosystems to strengthen international innovation, expand access to resources, and provide enhanced support for startups aiming to commercialize photonics technologies. Startups that are part of PhotonDelta or Luminate can get access to the benefits from each other's accelerator programs. This will enable photonics startups to leverage these ecosystems and relationships to accelerate innovation and scaling into the global market.

PhotonDelta and Luminate will work together to identify and vet candidates for participation in their programs and accelerator cycles. In addition, both organizations will introduce startups to their networks of industry experts, investors, mentors and production facilities. The collaboration will also provide soft-landing services as they establish a presence in both the USA and the Netherlands, offering startups access to USA and European markets.

The memorandum of understanding with Luminate also underpins the importance of the strategic collaboration between the Netherlands and New York state in semiconductors and integrated photonics. During the week of 10 June, a NY State delegation consisting of government officials and industry experts visited the Netherlands to strengthen connections and share knowledge. The trip was supported by the Dutch Ministry of Foreign Affairs and the Ministry of Economic Affairs.

The scope of the collaboration includes joint programming, beginning with a series of planned investor summits, pitch events, and webinars. This will include the Luminate 5x5 Pitches in August, Luminate Investor Summit in New York City on 12 September, the Luminate Finals on 22 October and the PIC Summit Europe event in Eindhoven, the Netherlands on 4–5 November. Executives from both organizations will meet quarterly to exchange insights on photonics developments and identify startups with strong potential for acceleration, funding, or market entry and develop new initiatives such as the Global Photonics Engineering Contest, which recently concluded with 33 submissions from all over the world.

Luminate, which was created and is administered by non-profit NextCorps and funded by Empire State Development's Finger Lakes Forward initiative, accepts 10–12 companies from around the world annually into its cohort-based program. The accelerator now has over 80 firms in its portfolio, representing a variety of industries, from AR/VR, quantum computing, and semiconductors to materials and metrology, autonomous vehicles, healthcare, and clean energy. These firms collectively have an estimated value of more than $700m. Luminate is a member of the NY Photonics cluster in a region that is home to over 150 optics companies.

PhotonDelta's ecosystem comprises over 75 different organizations that form a complete value chain, including design services, multiple foundries for photonic chip fabrication, packaging, assembly and testing, and a growing number of fabless firms that use PIC technology for innovative solutions. PhotonDelta, a Dutch-based industry accelerator focused on photonic chip technology, has secured €1.1bn to accelerate this next-generation semiconductor technology by running R&D programs, leading international roadmapping activities, and investing in pioneering startups that apply integrated photonics technology.

"The global integrated photonics industry is expected to grow with a CAGR [compound annual growth rate] of 45% to $10.3bn by 2029 [according to the report 'Silicon Photonics 2024' by market analyst firm Yole]," notes PhotonDelta's CEO Eelko Brinkhoff. "This partnership will give startups access to a more powerful, connected support network in the USA and the Netherlands. By combining our two ecosystems, we can fast-track innovation, investment, and access to new markets, empowering a new generation of photonics pioneers," he adds.

"Working with PhotonDelta allows us to combine strengths, support cross-order growth, and accelerate the development of breakthrough technologies," says Luminate NY's managing director & chief investment officer Sujatha Ramanujan. "We look forward to working with future promising startups that can lead this next wave of technological transformation."

PhotonDelta is a non-profit organisation supporting an end-to-end value chain for photonic chips that designs, develops, and manufactures innovative solutions that contribute to a better world. It does so by creating global awareness and promoting the benefits and potential of the Dutch and European photonic chip industry and its technologies. PhotonDelta is committed to facilitating the growth of startups, the creation of new photonic chip applications, as well as the development of infrastructure and talent. Leveraging a total of €1.1bn in funding from the Dutch Government, it catalyses the acceleration of the photonic chip industry.

www.luminate.org
www.photondelta.com

US Navy funds Aeluma to accelerate development and commercialization of high-speed photodetectors for optical interconnects

Funding targets defense & aerospace and AI infrastructure applications

Aeluma Inc of Goleta, CA, USA — which develops compound semiconductor materials on large-diameter substrates — has announced a contract with the US Navy that could accelerate development of high-speed photodetectors for government and commercial applications.

Aeluma's large-diameter wafer platform combines the performance of compound semiconductors with the scale of mainstream silicon manufacturing, enabling cost-effective solutions across high-growth markets including mobile, AI, defense & aerospace, automotive, AR/VR, and quantum computing. The platform has demonstrated high-speed photodetectors for optical interconnects with the potential to provide massive bandwidth scaling, critical for government applications, high-performance computing (HPC), and AI infrastructure.

The new contract is for up to $1.3m in funding, includes a major global interconnect manufacturer as a proposed subcontractor, and involves support from a top-tier government prime contractor. In addition to scaling for high-volume commercial markets, Aeluma's large-diameter wafer platform is compatible with wafer-scale integration with complementary metal-oxide-semiconductor (CMOS) electronics using advanced packaging technology, which is being aggressively pursued by major compute, data-center, networking and module suppliers for next-generation optical interconnects.

"This award is a clear vote of confidence in Aeluma's breakthrough technology and its potential to scale both in performance and in volume," reckons Matthew Dummer Ph.D., director of technology. "Building on our successful demonstrations of large-wafer photodetectors for sensing and communication applications, this funding will enable us to accelerate commercialization for high-growth commercial markets while meeting the demanding requirements of our customers in defense and aerospace."

Aeluma says that it continues to build momentum as it attracts interest from customers across a range of market verticals for its high-performance and scalable semiconductor platform. Combined with its quantum dot laser technology, the high-speed photodetectors position the firm to make a potential impact in critical areas for defense & aerospace, HPC, AI and quantum computing, it is reckoned.

Aeluma secures new contracts from NASA and US Navy

Awards to speed development and commercialization of next-generation quantum and sensing systems

Aeluma has won new contracts with NASA and the US Navy that could accelerate development and commercialization for next-generation quantum and sensing systems.

Aeluma's platform combines the performance of compound semiconductors with the scale of mainstream silicon manufacturing, enabling cost-effective solutions across high-growth markets including mobile, AI, defense & aerospace, robotics, automotive, AR/VR, and quantum computing.

The firm recently demonstrated nonlinear optical materials integration on CMOS-standard 200mm-diameter silicon substrates, providing a path to scale complex quantum photonic circuits. The new contract with NASA will advance Aeluma's efforts to commercialize entangled photon sources, a critical enabler for quantum computing and communication systems. By integrating nonlinear optical materials on CMOS-standard 200mm silicon, Aeluma provides a path to scale complex quantum photonic circuits while meeting NASA's stringent SWaP (size, weight and power) needs.

The new US Navy contract will support Aeluma's low-SWaP imaging sensors for next-generation submarine systems. Leveraging its ability to directly integrate SWIR (shortwave infrared) sensors on silicon, Aeluma enables multi-spectrum VIS (visible) + SWIR sensing in a single, compact chip. This technology is also directly aligned with Aeluma's commercial roadmap across mobile, AR/VR, robotics, and industrial sensing.

"We continue to build momentum in scaling our high-performance semiconductor platform for a diversity of applications across quantum, communications, and sensing," says founder & CEO Jonathan Klamkin Ph.D. "These contracts provide additional funding to accelerate development and commercialization, and to strengthen our relationships with government agencies, partners, and customers. Each contract we have secured is synergistic with our go-to-market strategy aimed at bringing performance semiconductors to high-growth commercial markets."

www.aeluma.com

EFFECT Photonics raises extra $24m in Series D funding round

Total Series D round amounts to $62m

EFFECT Photonics b.v. — a spin off from the Technical University of Eindhoven (TU/e) in The Netherlands that provides next-generation coherent optical solutions for data-center and edge networks — has raised an additional $24m as part of its Series D financing round. This brings the total raised in the round to $62m.

The firm says that the new capital underscores the ongoing commitment of existing investors and their continued confidence in its leadership in coherent technology and growing commercial momentum with leading industry partners.

"This funding milestone reinforces the strong market demand we're seeing and allows us to execute aggressively on our roadmap," says CEO Roberto Marcoccia. "We're grateful for the continued support of our investors and partners as we scale to meet the needs of a rapidly growing optical interconnect market."

The Series D round follows what is said to be significant technical and commercial progress. The firm's solutions are enabling the next wave of high-performance networking at the edge and AI infrastructure.

www.effectphotonics.nl
www.effectphotonics.com

TNO to construct InP-based photonic chip pilot manufacturing line

TNO collaborating with Photonic Integration Technology Centre, Eindhoven University of Technology and University of Twente

At the end of this year, research institute TNO (the Netherlands Organization for Applied Scientific Research in Delft) will begin constructing a pilot manufacturing line for photonic chips at the High Tech Campus in Eindhoven. The new factory will enable the industrial-scale production of indium phosphide (InP)-based photonic chips. Additionally, the scaling up from 4-inch to 6-inch wafers will make production more efficient. TNO is collaborating on this with the Photonic Integration Technology Centre (PITC), Eindhoven University of Technology, and the University of Twente.

Dutch companies such as SMART Photonics will use the facilities, which are intended to strengthen the entire Dutch ecosystem around photonic chips. The pilot line is funded through the EU Chips Act, PhotonDelta, the Ministry of Economic Affairs, the Ministry of Defense, and TNO, and is part of the European initiative PIXEurope.

"This 6" pilot line is a game-changer for Dutch companies and the future earning power and prosperity for the Netherlands," says TNO's managing director Ton van Mol. "It is a critical part of a powerful ecosystem in photonic chips with which the Netherlands can distinguish itself worldwide."

Ton van Mol.

Photonic chips strengthen technological independence

InP photonic chips are distinguished by their extremely compact size due to a high degree of integration. With their high speed, low energy consumption and large bandwidth, photonic chips improve the performance of data centers and enable new generations of smart devices. They play a crucial role in advanced applications such as AI, 6G networks, medical diagnostics, and defense systems. They are hence considered to be one of the key enabling technologies for the future.

For the Netherlands and Europe, photonic chips are also of strategic importance, as they enhance technological independence and create innovative and economic opportunities for companies in the high-tech sector. The total investment in the Dutch pilot line amounts to €153m. Also, the High Tech Campus Eindhoven is investing in the building and the cleanroom.

"This 6 pilot' pilot line is a game-changer for Dutch companies and the future earning power and prosperity for the Netherlands," believes Mol. "It is a critical part of a powerful ecosystem in photonic chips with which the Netherlands can distinguish itself worldwide.'

European collaboration

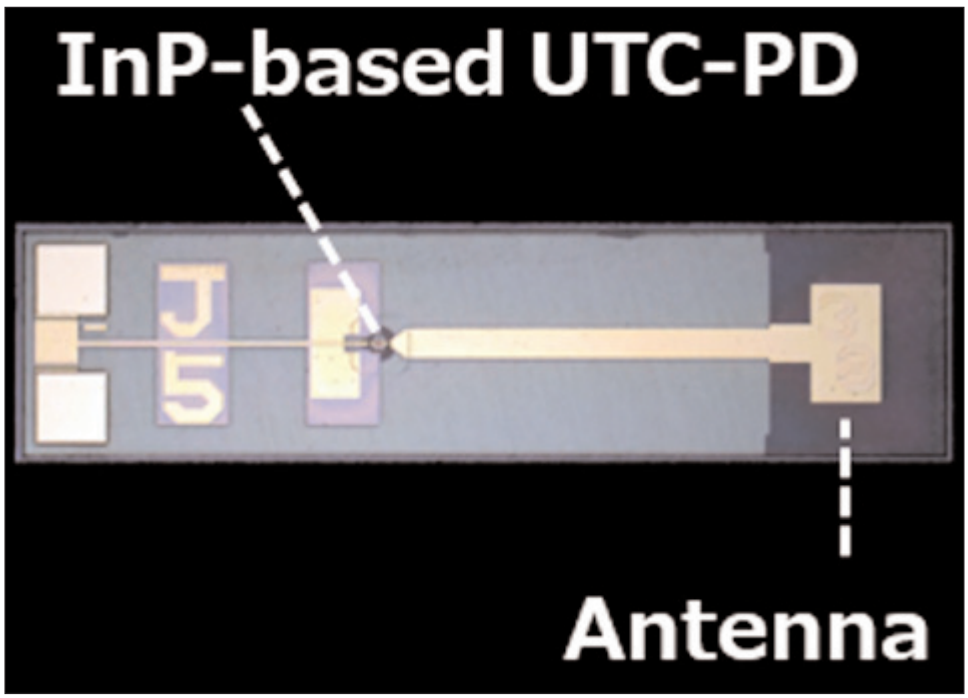
The new pilot line connects knowledge institutions and companies and will have a central place in the growing Dutch integrated photonics ecosystem. The factory in Eindhoven will also become part of the European initiative PIXEurope, a collaboration of knowledge institutions in 11 European countries. This project aims to create a European network of pilot manufacturing lines, focused on strengthening the entire value chain for integrated photonics in Europe.

www.photondelta.com
www.tno.nl

OKI and NTT establish mass-production technology for high-power terahertz devices by heterogeneous material bonding

Mass production targeted in fiscal 2026 for real-world implementation in 6G communications and non-destructive sensing

Tokyo-based Oki Electric Industry Co Ltd, in collaboration with Japan-based NTT Innovative Devices Corp, has established mass-production technology for high-power terahertz devices using its proprietary crystal film bonding (CFB) technology for heterogeneous material bonding to bond indium phosphide (InP)-based uni-traveling carrier photodiodes (UTC-PD) (a PiN junction photodiode that selectively uses electrons as active carriers) onto silicon carbide (SiC) with what are claimed to be excellent heat dissipation characteristics for improved bonding yields. UTC-PDs could operate faster and with much wider output linearity simply by excluding the hole transport contribution to the diode operation.



High-power terahertz devices using heterogenous material bonding.

Terahertz devices are expected to play a core technology role in supporting high-capacity low-latency communications for the next-generation 6G communication standard and high-precision non-destructive inspection for improved safety. Based on these results, both companies are working on product development, aiming to start mass production in fiscal year 2026.

Terahertz waves are electromagnetic waves in the range between radio waves and visible light, having both the penetrating characteristics of radio waves and the straightline propagation of light. Due to their non-invasiveness to the living body, which is a problem with x-ray inspection technology, terahertz waves are expected to be developed for applications including non-destructive inspection and security. In wireless communication applications, higher carrier frequencies contribute to increased communication capacity. On the other hand, terahertz waves have the drawback of being significantly attenuated in the atmosphere, creating the need for the development of high-power terahertz devices. Establishing mass-production technologies is also essential for real-world implementation.

To address these challenges, NTT Innovative Devices has been working to improve the performances (output power, output spectrum etc) of the UTC-photomixers (the module that applies UTC-PD to THz signal generation). Particularly in wireless communications, to propagate standard multi-level modulation signals over long distances, it is essential to achieve high output power at 1dB compression. To achieve the high output power at 1dB compression, NTT Innovative Devices and a team at The University of Osaka, Kyushu University and The University of Tokyo — under commission from Japan's National Institute of Information and Communications Technology (NICT) through the 'Beyond 5G R&D Promotion Program' (JPJ012368C-00901) — focused on the heat dissipation characteristics of the device and studied the technology of bonding InP-based UTC-PDs directly onto SiC with high heat dissipation characteristics. This paved the way to realize UTC-photomixers offering an approximately ten-fold performance increase (the output power at 1dB compression exceeding 1mW) compared with conventional devices.

In wafer bonding, due to the large bonding area, even a minute bonding defect at one location can cause a bonding failure over a large area. Therefore, more advanced bonding technology is required for mass production. For UTC-PD on SiC chip, material cost (effective use of materials) is also a demanding improvement item, because the required InP area is less than 10%

of the area in the chip.

OKI applied CFB technology to divide the InP-based crystal films on the InP-based epitaxial wafers at the device level, selectively picking up only the portions necessary for device operation before bonding them to the SiC wafers by heterogeneous material bonding. CFB technology, OKI's proprietary heterogeneous material bonding technology developed in the printer market and refined over about 20 years of mass production, has already established high yields.

The process also offers high efficiency, since InP-based crystal films divided at the device level are bonded all together at wafer-size scales.

The results of evaluating the yield of devices bonded using CFB technology show dramatically higher yields in the bonding process, with the bonding yield improving from about 50% to nearly 100% compared with conventional processes.

Additionally, dividing the crystal films at the device level and selectively bonding the devices has made it possible to make effective use of the crystal films that were previously discarded with conventional processes, helping to reduce costs and environmental impact by improving material utilization efficiency.

Both companies aim to build on the results of this joint research to start mass production of terahertz devices in fiscal year 2026 and strengthen collaboration with industry and academia to focus on commercializing 6G communication technologies and the broad application of non-destructive sensing

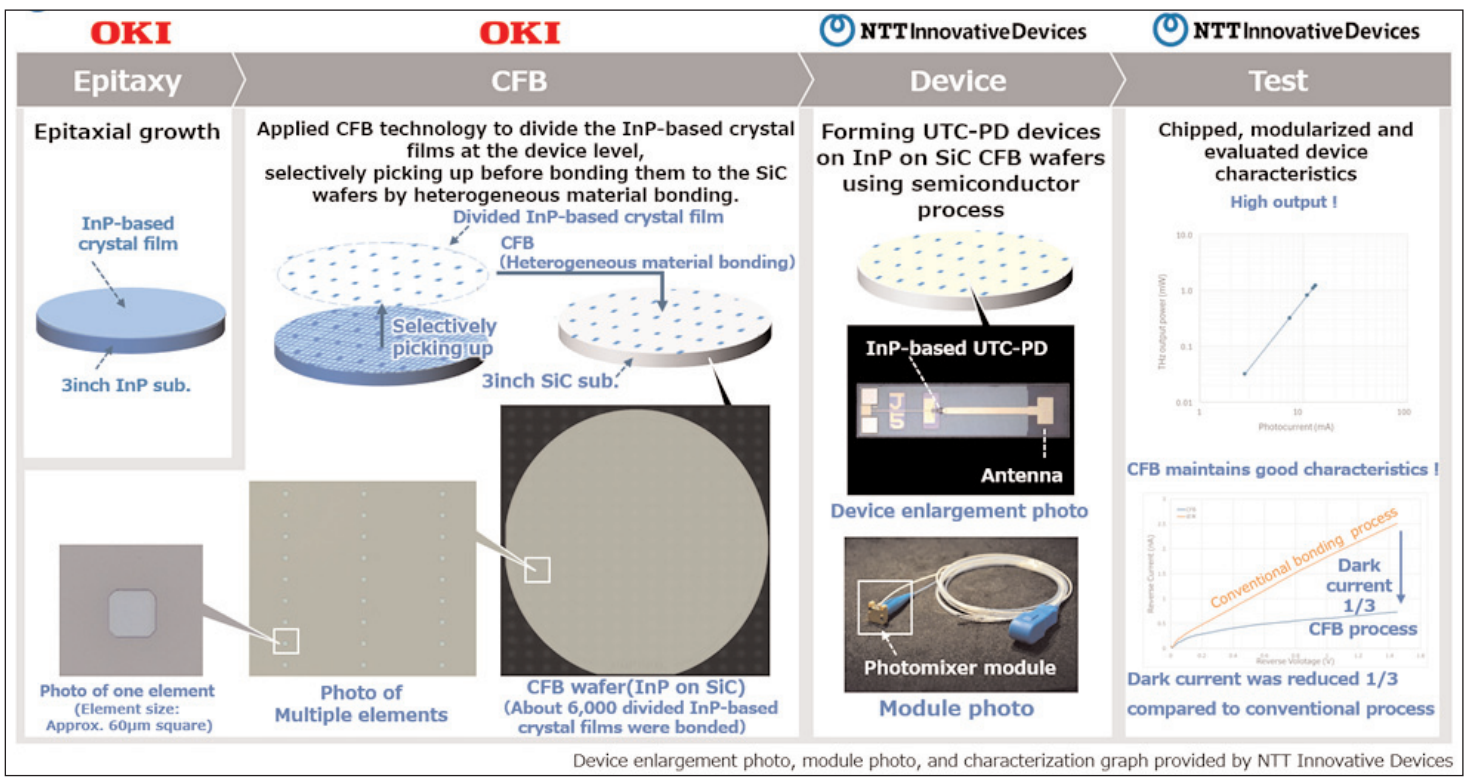
NTT Innovative Devices developed chips by forming UTC-PDs in the device process on SiC wafers with crystal films bonded using CFB technology. The results of device evaluations following chip development showed an output power at 1dB compression exceeding 1mW in a single device, demonstrating high output and excellent linearity. Compared with devices produced using conventional bonding processes, dark current was reduced to about one-third, confirming that the process using CFB technology is capable of bonding while effectively maintaining the characteristics of InP-based crystal films.

This co-creation work has established mass-production technology for high-power terahertz devices and made real-world implementation a reality.

Moving forward, both companies aim to build on the results of this joint research to start mass production of terahertz devices in fiscal year 2026 and strengthen collaboration with industry and academia to focus on commercializing 6G communication technologies and the broad application of non-destructive sensing technologies. Both companies will also draw on the jointly developed technology to accelerate efforts to contribute to a next-generation society, communicating to the world advanced technologies for both Japanese and global markets.

NTT Innovative Devices exhibited the technology at Laser World of Photonics 2025 in Munich, Germany (24–27 June).

www.ntt-innovative-devices.com/en
www.oki.com



Device enlargement photo, module photo, and characterization graph provided by NTT Innovative Devices

Overview of the co-creation process.

Phlux makes available evaluation board for Aura Noiseless InGaAs APDs

Evaluation board simplifies infrared system development

Phlux Technology — which was spun off from the University of Sheffield in 2020 — is offering an evaluation board for its Aura family of Noiseless InGaAs avalanche photodiodes (APDs). The APDs are used as 1550nm infrared sensors and claim 12x greater sensitivity than traditional devices in applications spanning laser rangefinders, optical networks and test equipment, and LiDAR.

Phlux's Noiseless InGaAs APD technology adds an antimony (Sb) alloy to the indium gallium arsenide structure. The resulting devices operate with an internal gain of up to 120 or beyond, enabling the weakest signals to be detected above the noise floor. They are also claimed to exhibit greater temperature stability and faster large-signal recovery than traditional InGaAs infrared sensors.

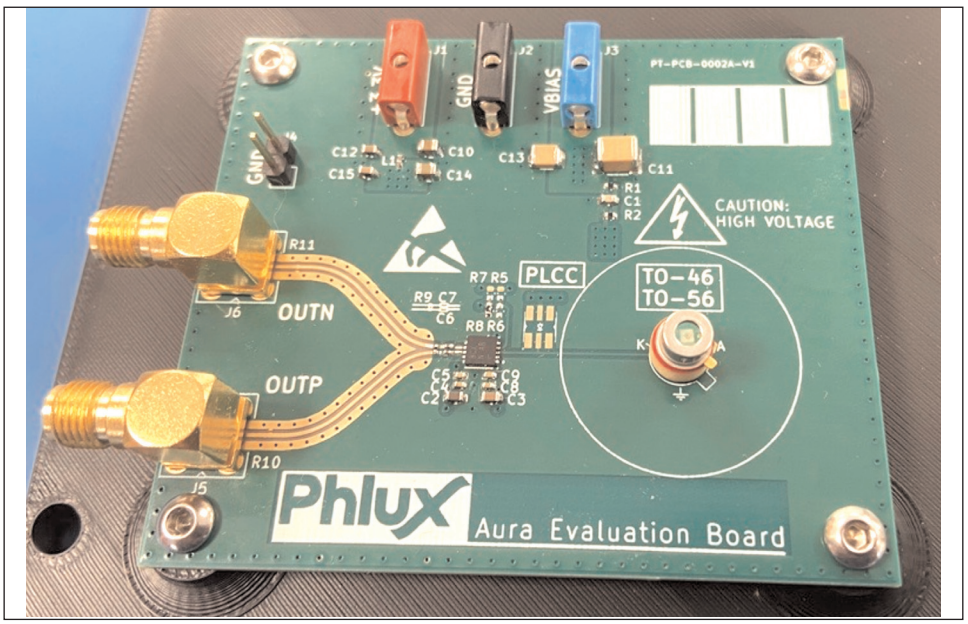
Available to order now, the 70mm x 60mm evaluation board, which comes with a MAX40661 transimpedance amplifier, is designed to accelerate design and development by simplifying the evaluation and measurement of Phlux's Aura line of APDs (200µm, 80µm and 30µm devices). Customers can quickly set-up measurements such as

APD dark current, responsivity, noise equivalent power (NEP), input referred noise (IRN) and dynamic characteristics like impulse response, rise and fall times, and output swing to compare with existing designs. The board has a protected DC-coupled input and an AC-coupled differential or single-ended output via 50Ω SMA connectors. It requires a single, low-noise +3.3V DC power supply, and the recommended V_{bias} is preset to meet the required level of responsivity. It is recommended for use with a 250MHz-bandwidth oscilloscope.

The evaluation board accepts hermetically sealed TO-46 or TO-56 packaged APDs or ceramic PLCC6 SMD packaged devices with a quartz window. These packages are supported by Phlux, but the board also allows for performance comparison with other commercially available devices in similar formats.

In addition to the evaluation board using the MAX40661 COTS preamplifier, Phlux has developed an ultra-low-noise preamplifier circuit from discrete components to enable best-in-class NEP performance of <30fW/√Hz for demanding rangefinder and LiDAR applications with up to 75MHz bandwidth using the Aura 200µm APD. This design is suited to defence applications.

www.phluxtechnology.com



Evaluation board for Phlux's Aura Noiseless InGaAs APDs, for use as 1550nm infrared sensors.

Phlux adds high-speed, high-bandwidth 30µm APDs to the Aura family of 1550nm IR sensors

Lower capacitance of 0.15-0.4pF increases cut-off frequency to 3.5GHz, versus 1.8GHz for 80µm version and 0.7GHz for 200µm

Phlux Technology — which was spun off from the University of Sheffield in 2020 and designs and manufactures 1550nm avalanche photodiode (APD) infrared sensors — has announced a 30µm optical window version of the Aura family of 1550nm Noiseless InGaAs APDs.

The sensors, which are also available in 80µm and 200µm versions, are said to be 12x more sensitive than traditional InGaAs APDs and have inherently fast impulse response and short diffusion tails. The new 30µm version features lower capacitance at 0.15–0.4pF, which increases the cut-off frequency to 3.5GHz, compared with the 80µm version at 1.8GHz and 200µm at 0.7GHz. This makes it suitable for high-speed, time-critical applications, such as those found in gigabit-speed optical communications, including free-space applications, and optical time domain reflectometry (OTDR) test equipment.

The 30µm Aura has an excess noise factor of <3.5 at a gain of 100 with low dark current and sensitivity 12x that of traditional APDs. Spectral noise current at a gain of 50 is 260pA/RtHz, which is 5.2fW/RtHz at R=1.0A/W. In addition, the damage threshold of 30MW/cm^2, combined with fast recovery characteristics that minimize attenuation and event dead zones, delivers optimum performance in OTDR and fiber-sensing applications. High optical dynamic range and the ability to operate across a wide range of pulse widths means that OTDRs can test longer or more lossy fibres.

Phlux says that the high sensitivity of its APD sensors extends the range of infrared systems by up to 50% for a given laser power. Alternatively, they can enable substantial reductions in the laser power required, lowering system costs by up to 40% and size and weight by up to 30%. When laser power is reduced, thermal management is less challenging, and system reliability is enhanced. Aura APDs will operate at up to +85°C with minimal performance degradation, which is significantly higher than traditional sensors. They are designed to meet MIL-STD-883, qualified to Telcordia GR-468 and are drop-in replacements for existing surface-mount or TO-packaged components. The sensors will also be offered as bare die later this year.

Phlux's 30µm Noiseless InGaAs APDs.

We're seeing growing demand for these high-speed, precision versions of our Aura Noiseless InGaAs APDs, particularly from the optical communications sector but in other areas such as optical test equipment and light detection & range-finding

"We're seeing growing demand for these high-speed, precision versions of our Aura Noiseless InGaAs APDs, particularly from the optical communications sector but in other areas such as optical test equipment and LiDAR," notes CEO Ben White. "The expanded product family allows our customers to choose the optimum device characteristics for their application. Whichever product they select, they're guaranteed industry-leading sensitivity and performance."

Noiseless InGaAs APD technology was developed by adding an antimony alloy to the compound semiconductor manufacturing process. The resulting devices operate with internal gain of up to 120, enabling the smallest signals to be detected above the noise floor.

The new sensors are sampling now, and datasheets can be downloaded here.

www.phluxtechnology.com

Imec and Ghent University present fully integrated, single-chip microwave photonics system for compact and versatile signal processing

Programmable solution for higher-speed wireless communication networks and low-cost microwave sensing

Nanoelectronics research center imec of Leuven, Belgium and two imec research groups at Ghent University (the Photonics Research Group and IDlab) have demonstrated a fully integrated single-chip microwave photonics system, combining optical and microwave signal processing on a single silicon chip (Hong Deng et al, 'Single-chip silicon photonic engine for analog optical and microwave signals processing' Nature Communications volume 16, Article number 5087 (2025)).

The chip integrates high-speed modulators, optical filters, photodetectors and transfer-printed lasers, making it a compact, self-contained and programmable solution for high-frequency signal processing. This can replace bulky and power-hungry components, enabling faster wireless networks, low-cost microwave sensing, and scalable deployment in applications like 5G/6G, satellite communications, and radar systems.

As demand for higher data rates and operation at higher frequencies grows, new communications networks need much tighter integration between these high-speed fiber-optic links and wireless radio-frequency microwave transmission to overcome the struggle with signal processing complexity, high transmission losses, and power-hungry electronics. Microwave photonics offers a promising solution by using optical technology to process high-frequency signals with lower loss, higher bandwidth, and improved energy efficiency. However, most microwave photonics systems rely on bulky, fiber-based architectures that limit scalability. In contrast integrating microwave photonics onto a chip could enable more scalable and power-efficient systems, but early experimental demonstrations have either lacked key functionalities or required external components to achieve full performance.

Imec and Ghent University now demonstrate a silicon photonic engine that processes and converts both optical and microwave signals on a single chip. The key innovation lies in the novel combination of a reconfigurable modulator and a programmable optical filter enabling efficient modulation and filtering of microwave signals while significantly reducing signal loss. This unique combination enhances overall performance, allowing the system to handle complex signal processing tasks with greater flexibility and efficiency for a wide range of applications.

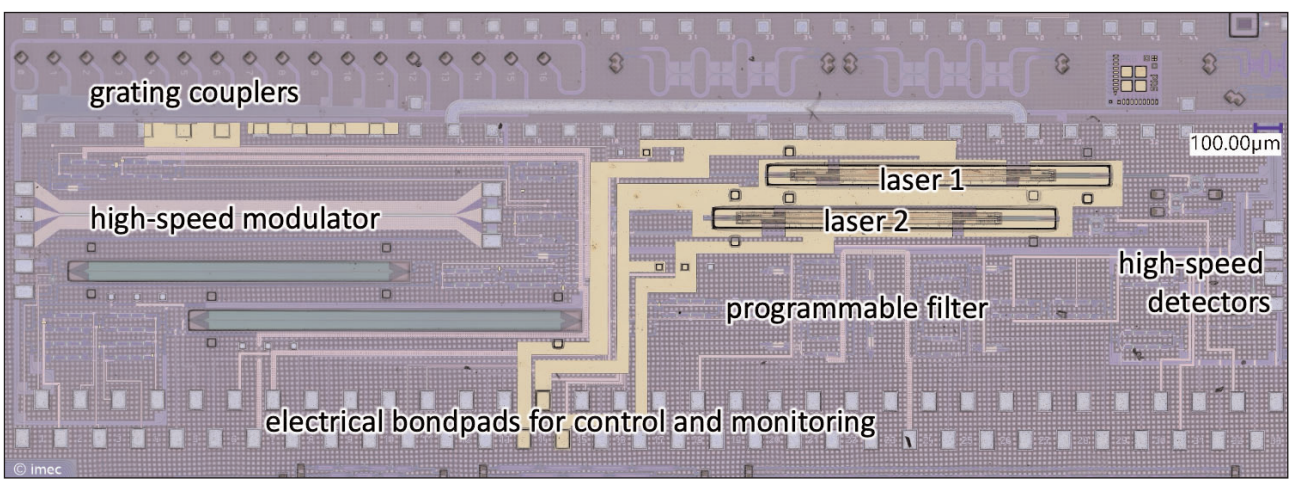
The chip is fabricated on imec's standard iSiPP50G silicon photonics platform, which includes low-loss waveguides and passive components, high-speed modulators and detectors and thermo-optic phase shifters for tuning the optical response. To provide an integrated light source, the researchers incorporated an indium phosphide (InP) optical amplifier (developed by III-V Lab) on the chip using the microtransfer-printing technology developed at the Photonics Research Group (imec/Ghent University). In combination with on-chip tunable filter circuits, this allows the optical amplifier to function as a widely tunable laser, further enhancing the system's versatility.

"The ability to integrate all essential microwave photonics components on a single chip marks a major step toward scalable and energy-efficient high-frequency signal processing," says Wim Bogaerts, professor in the Photonics Research Group at Ghent University and imec.

"By eliminating bulky external components, this technology paves the way for more compact, cost-effective solutions in next-generation wireless networks and advanced sensing systems."

www.nature.com/articles/s41467-025-60100-0

www.imec-int.com



Fraunhofer IAF develops semi-automated manufacturing process for cost-efficient resonantly tunable QCL modules

The Fraunhofer Institute for Applied Solid State Physics IAF of Freiburg, Germany has developed a semi-automated manufacturing process for resonantly tunable quantum cascade laser modules (MOEMS-EC-QCLs). This laser technology is characterized by very broad and extremely fast spectral tunability, enabling real-time spectroscopy and inline measurement systems in various industries. The process significantly accelerates the modules' manufacturing and reduces its costs. Fraunhofer IAF presented the process by example of a multi-core system at the Laser World of Photonics 2025 in Munich, Germany (24–27 June). The system combines four modules via multiplexing and achieves effective spectral measurement speeds of over 1 million wavenumbers per second.

Resonantly tunable quantum cascade lasers (QCLs) are high-performance laser light sources for a wide range of spectroscopy applications in the mid-infrared (MIR) range. Their high brilliance enables minimal measurement times for more precise and efficient characterization processes and can be used, for example, in chemical and pharmaceutical industries, medicine or security technology. Until now, however, the production of QCL modules has been relatively complex and expensive.

Fraunhofer IAF has hence developed a semi-automated manufacturing process that significantly simplifies the production of resonantly tunable QCL modules with a MOEMS (micro-opto-electro-mechanical system) grating scanner in an external optical cavity (EC). The MOEMS-EC-QCL technology was developed by Fraunhofer IAF in collaboration with the Fraunhofer Institute for Photonic Microsystems IPMS.

The laser technology is characterized by very broad and extremely fast spectral tunability, enabling real-time spectroscopy and inline measurement systems in various industries. The process significantly accelerates the modules' manufacturing and reduces its costs.

Inline measurements in industrial processes

"The market potential of MOEMS-EC-QCLs is enormous. The high brilliance, in combination with spectral tunability due to the use of MOEMS diffraction gratings, enables the further development of measurement methods based on Fourier transform infrared (FTIR) spectroscopy and their use for inline measurement technology," says Dr Marko Haertelt, leader of the Laser Measurement Technology Group at Fraunhofer IAF.

"We have now been able to bring the technology to an industry-ready level in terms of cost and availability: on the one hand, by placing the production of MOEMS-EC-QCL modules on a semi-automated manufacturing basis; on the other hand, by using a scalable approach to couple modules with complementary spectral ranges," Haertelt continues. "The latter significantly reduces the number of different modules required to cover the entire MIR range from 4µm to 11µm, achieving the necessary economies of scale."

Semi-automated production of quantum cascade lasers

The high manufacturing costs are the main obstacle to the widespread use of MOEMS-EC-QCLs: Until now, it was only possible to assemble the modules by hand because they had to be actively adjusted. The new process automates the MOEMS-EC-QCL assembly process in essential parts with the help of a pick-and-place system, which significantly reduces manufacturing costs.

In addition, Fraunhofer IAF has developed a flexible and scalable method for efficiently combining multiple laser sources into a multi-core system. Individual QCL modules have only a limited spectral width. By combining modules with supplementary spectral ranges, application-specific multi-core systems can be configured that achieve effective spectral measurement speeds of more than 1 million wavenumbers per second.

Due to more efficient assembly and combination processes, the advantages of QCL technology are to be made widely available for the first time, particularly to small- and medium-sized enterprises (SMEs), says Fraunhofer IAF.

Advantages and areas of application of MOEMS-EC-QCLs

MOEMS-EC-QCLs are characterized by broad spectral tunability in the mid-infrared wavelength range between 4µm and 11µm and high spectral brilliance. They suit a wide range of spectroscopy methods (transmission, backscattering, ATR, microfluidic, point-of-interest spectroscopy) and allow complete infrared spectra to be recorded in just 1ms.

Potential application for MOEMS-EC-QCLs are correspondingly diverse: They can be used, for example, in semiconductor measurement technology to determine epitaxial layer thicknesses and their compositions, in process analytics to optimize chemical reactions, in process control to test coatings, in security technology to detect hazardous substances or intoxicants, and in the pharmaceutical industry for quality assurance.

Multi-core system at Laser World of Photonics 2025

To demonstrate the newly developed manufacturing and combination processes for MOEMS-EC-QCL modules, at Laser World of Photonics Fraunhofer IAF presented a multi-core system multiplexing four semi-automatically manufactured MOEMS-EC-QCL modules (plus associated peripherals) that achieves effective spectral measurement speeds of over 1 million wavenumbers per second.

www.world-of-photonics.com
www.iaf.fraunhofer.de/en.html

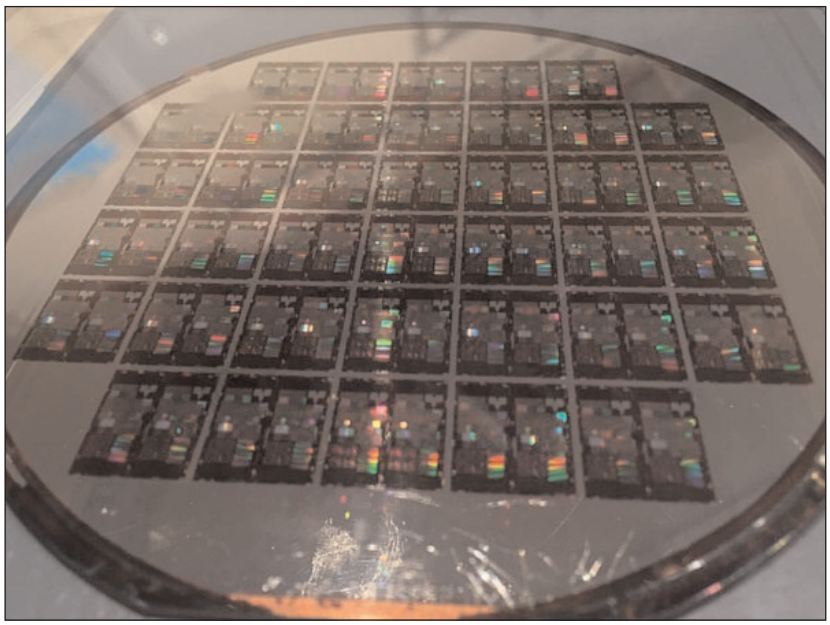
Efficient integration of quantum dot lasers on silicon chiplets

UCSB-led team develops novel method for integrating quantum dot laser within silicon for scalable photonics

Although III-V semiconductor lasers can be monolithically integrated with photonic chips by directly growing a crystalline layer of laser material (such as indium arsenide) on silicon substrate, photonic chips with such integrated laser source are challenging to manufacture due to mismatch between structures or properties of III-V semiconductor material and silicon.

The University of California, Santa Barbara (UCSB) and a team including AIM Photonics at the Research Foundation for the State University of New York (SUNY) and Boston-based Analog Photonics have now integrated indium arsenide quantum dot (QD) lasers monolithically on silicon photonics chiplets (IEEE Journal of Lightwave Technology, vol 43, issue 12 (15 June 2025)).

"Photonic integrated circuit applications call for on-chip light sources with a small device footprint to permit denser component integration," notes the paper's lead author UCSB's Dr Rosalyn Koscica. To achieve this monolithic integration, the authors combined three key concepts: the pocket laser strategy for monolithic integration, a two-step material growth scheme that includes both metal-organic chemical vapor deposition and molecular beam epitaxy (MBE) for a smaller initial gap size, and a polymer gap-fill approach to minimize optical beam divergence in the gap.

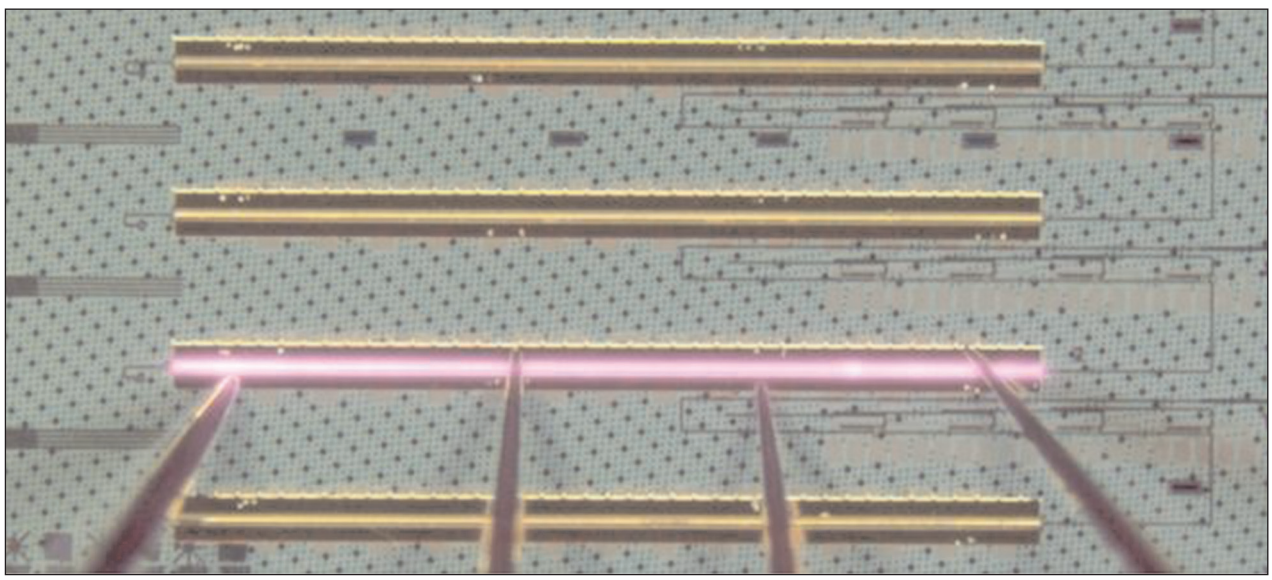


On testing, the chiplets with monolithically integrated lasers demonstrated sufficiently low coupling loss. As a result, the QD lasers operate efficiently on a single O-band wavelength within chiplets. The O-band wavelength is desirable as it allows for transmission of signals within photonic devices with low dispersion. Lasing in the single frequency is achieved using ring resonators made from silicon or distributed Bragg reflectors (DBR) made from silicon nitride.

"Our integrated QD lasers demonstrated a high-temperature lasing up to 105°C and a life span of 6.2 years while operating at a temperature of 35°C," says Koscica.

The proposed integration technique can be applied to a variety of photonic integrated circuit designs, paving the way for a scalable, cost-effective monolithic integration of on-chip light sources for practical applications.

https://ieeexplore.ieee.org/document/10944565



Quantum dot DBR lasers monolithically integrated on silicon photonics by in-pocket heteroepitaxy.

Ayar strengthens leadership team and expands globally

Firm adds VP of engineering, and expands US and Taiwan operations

Silicon photonics-based chip-to-chip optical connectivity firm Ayar Labs of San Jose, CA, USA — which is pioneering co-packaged optics (CPO) for large-scale AI workloads — has expanded its leadership team with Vivek Khanzodé joining it as VP of engineering. To support its efforts in high-volume manufacturing and CPO adoption, the firm has also opened a new office in Taiwan and doubled the size of its San Jose headquarters, bolstering its aim to transform AI connectivity with optical interconnects.

"As the industry accelerates its shift toward CPO solutions, we are taking decisive steps to ensure Ayar Labs leads this market transition," says co-founder & CEO Mark Wade. "Expanding in Taiwan places us at the center of the global semiconductor ecosystem, allowing us to access world-class talent and deepen partnerships with key industry players," he adds. "Combined with the expertise of leaders like Vivek, we are ready to deliver the solutions customers need to revolutionize next-generation AI infrastructure."

Khanzodé joins from Marvell Technology Inc, where he led its pre- and post-silicon validation for products that shipped in the hundreds of millions annually. A semiconductor executive with more than 30 years of engineering leadership experience, Khanzodé's expertise in scaling complex semiconductor products will be instrumental as Ayar's builds toward high-volume manufacturing and commercial adoption, the firm reckons.

Ayar says that its new office in Hsinchu, Taiwan will enable it to closely collaborate with the local Taiwan semiconductor ecosystem and leverage the region's talent pool. Scott Clark, who joined as VP of manufacturing & operations nearly three years ago, will expand his role to include oversight of operations in Taiwan, basing himself in the country.

Expansion of the leadership team and global presence comes at a key time for Ayar. Earlier this year, it unveiled its industry-first UCIe optical interconnect chiplet for CPO, which is said to eliminate data bottlenecks by maximizing AI infrastructure performance and efficiency while reducing latency and power consumption. In addition, Ayar secured $155m in Series D funding from AMD, Intel Capital, NVIDIA, and others to address the need for scalable, cost-effective AI infrastructure.

Ayar says that it will be hiring for a number of engineering and related roles in the USA and Taiwan. **https://ayarlabs.com/careers.**

Dhruva's Solis+ space-grade solar panels to be used by Pixxel

All-Indian collaboration to integrate GaAs solar cells into hyperspectral imaging satellites

Dhruva Space Private Ltd of Hyderabad, India (which provides satellites coupled with Earth stations and launch services) has entered into a strategic partnership with Bengaluru-based space data firm and spacecraft manufacturer Pixxel, which is building the world's highest-resolution hyperspectral imaging satellite constellation (enabling the detection, monitoring and prediction of critical global phenomena across agriculture, oil & gas, mining, environment, and other sectors, with what is reckoned to be 50x richer detail than conventional satellites). This India-based collaboration will see Dhruva joining forces with Pixxel to integrate space-grade solar panels into their next satellite fleet.

Dhruva Space's chief technology officer & co-founder Abhay Egoor with Pixxel's chief technology officer & founder Kshitij Khandelwal.

Dhruva designs and develops small satellites and key subsystems, including space-grade solar panels. Its Solis+ panels are engineered for high-performance power generation in orbit. Built with high-efficiency (up to 30%) triple-junction gallium arsenide (GaAs) solar cells, Solis+ is designed to operate reliably in the extreme conditions of space. Precision-manufactured in-house, the panels offer power capacities in the range of several kilowatts, making them suitable for larger classes of satellites and spacecraft. Last November, Dhruva delivered a Solis+ order to the Government of India and is currently fulfilling export orders for customers in the United Arab Emirates (UAE), Austria, Australia and France.

Designed for daily global revisit and high spectral fidelity, Pixxel's upcoming fleet of satellites builds on its Firefly satellites launched in 2025, which marked the world's first 5m commercial hyperspectral imagery.

"Power systems are mission-critical, and there's no room for errors in space. As we expand our capabilities, we're building with partners who bring deep technical ability and a shared focus on mission readiness, and Dhruva Space exemplifies both," comments Pixxel's founder & chief technology officer Kshitij Khandelwal. "This collaboration reflects a shared drive to engineering excellence and a commitment to delivering high-quality, accessible satellite data to those tackling global challenges. It also marks an important step in strengthening India's space hardware ecosystem and building resilient infrastructure to support critical needs on Earth," he adds.

"There are very few players globally who design, manufacture, qualify and export space-grade solar panels," notes Dhruva Space's chief technology officer & co-founder Abhay Egoor. "Solis+ technology, designed for low-Earth orbit (LEO) and high-mission durability, is a result of years of indigenous R&D and spaceflight heritage. Two high-performance players from India's private space sector collaborating at this level signals the maturing of the ecosystem. This is not just a hardware agreement; it's a signal to the global market that Indian space-tech companies are building with flight heritage, scalability and export readiness in mind," he adds.

"Dhruva Space is currently setting up a first-of-its-kind spacecraft manufacturing facility in South Asia, spread across 6.5 acres with a built-up area of 280,000ft^2," Egoor continues. Of the total area, 30,000ft^2 is dedicated to the design and development of space-grade solar arrays, while 40,000ft^2 will serve as a full-fledged assembly, integration & testing (AIT) zone with parallel bays for simultaneous integration of spacecraft of up to 500kg classes. This facility is a major step toward Dhruva Space's goal of enabling vertical integration and scalable spacecraft production from Indian soil."

The partnership is said to highlight the growing interdependence of Indian private space companies and their increasing role in building globally competitive space infrastructure.

www.pixxel.space

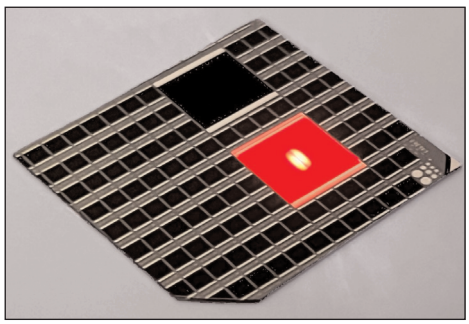
Fraunhofer ISE develops indoor photovoltaics with over 40% efficiency

Design optimized and solar cell absorber material quality improved

Fraunhofer Institute for Solar Energy Systems ISE in Freiburg, Germany has developed solar cells based on III–V semiconductors that can achieve an efficiency of over 40% indoors (Kliitzke et al, Applied Physics Letters 127, 023301).

By optimizing the design and improving the quality of the solar cell absorber material, the research team achieved high efficiencies even under very low light conditions of just 100lux. This makes the technology particularly attractive for autonomous Internet of Things (IoT) applications that operate indoors without an external wired power supply.

Indoor photovoltaics use the artificial light indoors to generate electricity. This technology is particularly useful for devices that cannot be constantly charged, such as many components in IoT systems. "Various photovoltaic technologies can be used for this purpose," notes Dr Henning Helmers, head of department at Fraunhofer ISE. "Solar cells based on III–V semiconductors reach the highest efficiencies; this especially applies to artificial (LED) light."



Under laser excitation, the GaInP indoor solar cell glows bright red, indicating the high material quality.

In their study, the researchers optimized gallium indium phosphide (GaInP) solar cells, as their bandgap is almost ideal for converting visible light into electricity. "We investigated how well the solar cells with different architectures work under low light conditions," summarizes Fraunhofer ISE scientist Malte Klitzke, lead author of the study.

"It was shown that the n-doped GaInP cell performs significantly better than the p-doped cell. Charge carriers in n-doped GaInP cells have a longer lifetime, and thus they can produce more electricity even under weak light. This enabled us to achieve very high efficiencies with them in our experiments when converting weak indoor light into usable power."

The research result combines findings from several research projects: '50Percent', funded by Germany's Federal Ministry of Economics and Climate Protection (BMWK), 'H2Demo', funded by the Federal Ministry of Education and Research (BMBF) and 'SMART', supported by AZUR SPACE Solar Power GmbH of Heilbronn, Germany (which develops and manufactures multi-junction solar cells based on III-V compound semiconductor materials) and the German Space Agency (DLR).

https://50-percent.de
www.ise.fraunhofer.de
https://pubs.aip.org/aip/apl/article/127/2/023301/3352451/Optimization-of-GaInP-absorber-design-for-indoor

Ascent raises CIGS PV production-scale efficiency record from 14% to 15.7%

Strategy to improve material quality, efficiency and production design targets space market

Ascent Solar Technologies Inc of Thornton, CO, USA says that its flexible thin-film copper indium gallium diselenide (CIGS) photovoltaic (PV) technology has reached record energy conversion efficiency of 15.7% (AM0) at production scale. The achievement aligns with the firm's previously announced 2025 strategy, which aimed to continue improving on its thin-film PV's material quality, technological efficiency and production design optimization to increase the applicability of the technology in the space market.

Using the Titan, a module about 1ft^2 in size, Ascent can now produce 15.7W in power per unit. These modules are about 0.03mm in thickness, weigh just over 8g, and have a power density of 1960W/kg before encapsulation.

Ascent says its engineering and production teams have consistently achieved increases in device efficiency and overall performance since September 2023. In the last 18 months, Ascent has reached significant milestones in efficiency testing, with the latest achievement of 15.7% representing a significant rise from Q1/2024's 14%, Q4/2023's 13.3%, and Q3/2023's 11.6%.

"These continued efficiency improvements for our CIGS arrays are the direct result of our US-based manufacturing team's tireless focus on process improvement and advanced device engineering," says CEO Paul Warley. "The jump in device efficiency we've experienced over the past two years has dramatically enhanced our technology's readiness for the space market, positioning it as an ideal solar material choice for satellite power systems and other spacecraft."

Ascent signs master services agreement to provide NOVI Space with rollable PV array blankets

AI edge processing satellite constellation due to launch in early 2026

Ascent Solar has signed a master services agreement with NOVI Space Inc, a Virginia-based space AI infrastructure & compute company that develops and operates AI-powered satellites with their TRL-9 edge computing technology.

Ascent has been contracted to provide rollable PV array blankets to NOVI to deliver real-time Earth observation insights directly from space. NOVI plans to utilize the lightweight, rollable solar technology in their AI edge processing constellation, scheduled for launch in early 2026.

As part of the supply agreement, NOVI will provide Ascent with solar array operational performance data from orbit. This allows it to rapidly iterate and validate product enhancements for future missions and continue to build on years of R&D and specialty engineering for products suitable to thrive in the rigors of space.

"Having a high technology-readiness level [TRL] isn't enough assurance for discerning space operators, a challenge that Ascent can uniquely address with our thin-film photovoltaic production solutions," says Ascent's CEO Paul Warley. "The ability to reliably deliver power on shorter installation timelines removes solar arrays as a barrier to completion for mission schedules, allowing constellations of spacecraft to be completed sooner. Ascent combines both high TRL and MRL with mission-enabling features, helping partners like NOVI to do more, faster and with greater confidence."

Having a high technology-readiness level isn't enough assurance for discerning space operators, a challenge that Ascent can uniquely address

Ascent has the capabilities to deliver mission-optimized solar array solutions based on CIGS PV products already developed with spaceflight heritage. Manufactured in its 5MW production facility, its high-maturity CIGS PV products enable delivery of arrays in just 6–8 weeks, versus market competition that typically struggles to meet aggressive delivery schedules and strives for 9–12 month lead times, Ascent claims. Its recent pair of orders received for spaceflight hardware assemblies are on schedule to be completed and delivered this summer.

"We are glad to have found a partner in Ascent that is able to provide plug-and-play arrays for our current bus, enabling NOVI to launch its first set of commercial satellites in first-quarter 2026," says NOVI Space's chief revenue officer & co-founder Scott Steffan.

www.novispace.ai
www.AscentSolar.com

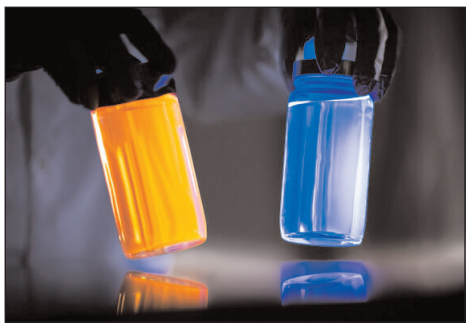
UbiQD and First Solar establish long-term quantum dot supply agreement

Firms also expand PV module R&D collaboration focused on optimizing performance of utility-scale solar

Nanotechnology firm UbiQD Inc of Los Alamos, NM, USA has entered into an exclusive, multi-year agreement to supply its proprietary fluorescent quantum dot (QD) technology to cadmium telluride (CdTe) thin-film photovoltaic (PV) module maker First Solar Inc of Tempe, AZ, USA. The agreement paves the way for the incorporation of QD technology into First Solar's thin-film bifacial photovoltaic solar panels.

The supply agreement is expected to enable the early adoption of QD in thin-film modules, which has the potential for UbiQD to grow to over 100 metric tons of production per year. The two firms previously announced a joint development collaboration in 2023, the results of which have supported the new supply agreement and expanded R&D collaboration.

The US-based collaboration comes as the country aims to rapidly expand competitive power-generation capacity to serve demand from data centers, artificial intelligence (AI), and manufacturing.



"This is a turning point for the quantum dot industry with this first high-volume QD supply agreement outside of display," notes UbiQD's founder & CEO Hunter McDaniel PhD. "This partnership showcases how US innovation and manufacturing can deliver differentiated performance especially at a time when making breakthroughs in efficiency and materials is more vital than ever," he adds. "First Solar has been an excellent partner, and together we've demonstrated not just performance benefits, but also the cost-effectiveness and scalability of our materials for solar spectrum optimization."

UbiQD's core proprietary quantum dot technology was originally developed at US-based research institutions Los Alamos National Laboratory and Massachusetts Institute of Technology (MIT). When incorporated into solar panel encapsulation, QDs can more than double the bifacial quantum efficiency of light conversion for specific wavelengths/colors — a critical edge as solar manufacturers compete globally on performance and price.

"At utility-scale, even incremental gains in bifaciality translate into significant real-world impact on energy yield," notes First Solar's chief technology officer Markus Gloeckler. "We're excited about the potential for quantum dot technology to contribute meaningful gains to the performance of our bifacial modules."

This momentum follows UbiD's $20m Series B round of fundraising announced in April, which in the coming year is enabling the firm's plans over the next year to build one of the world's highest-volume QD manufacturing facilities.

www.firstsolar.com
www.ubiqd.com

Tracking down sources of efficiency droop

Researchers at UIUC have modified the ABC model to extract the impacts of Auger–Meitner recombination, charge polarization, and junction temperature.

University of Illinois Urbana-Champaign has modified the ABC model of light-emitting diodes (LEDs) to enable the extraction of internal quantum efficiencies (IQEs) and thus give an assessment of the various effects that reduce LED performance [P. Thirasuntrakul, Appl. Phys. Lett., v126, p211103, 2025].

The ABC model refers to a theoretical assumption that the rate of carrier recombination in the LED can be represented as a simple power series in the carrier concentration (n): $An+Bn^2+Cn^3$. The ABC coefficients are roughly associated, respectively, with

- Shockley–Read–Hall recombination,
- electron–hole recombination into photons producing the light we want from an LED, and
- Auger–Meitner recombination, where three carriers interact and the energy from two of them recombining is carried off by the third rather than a photon.

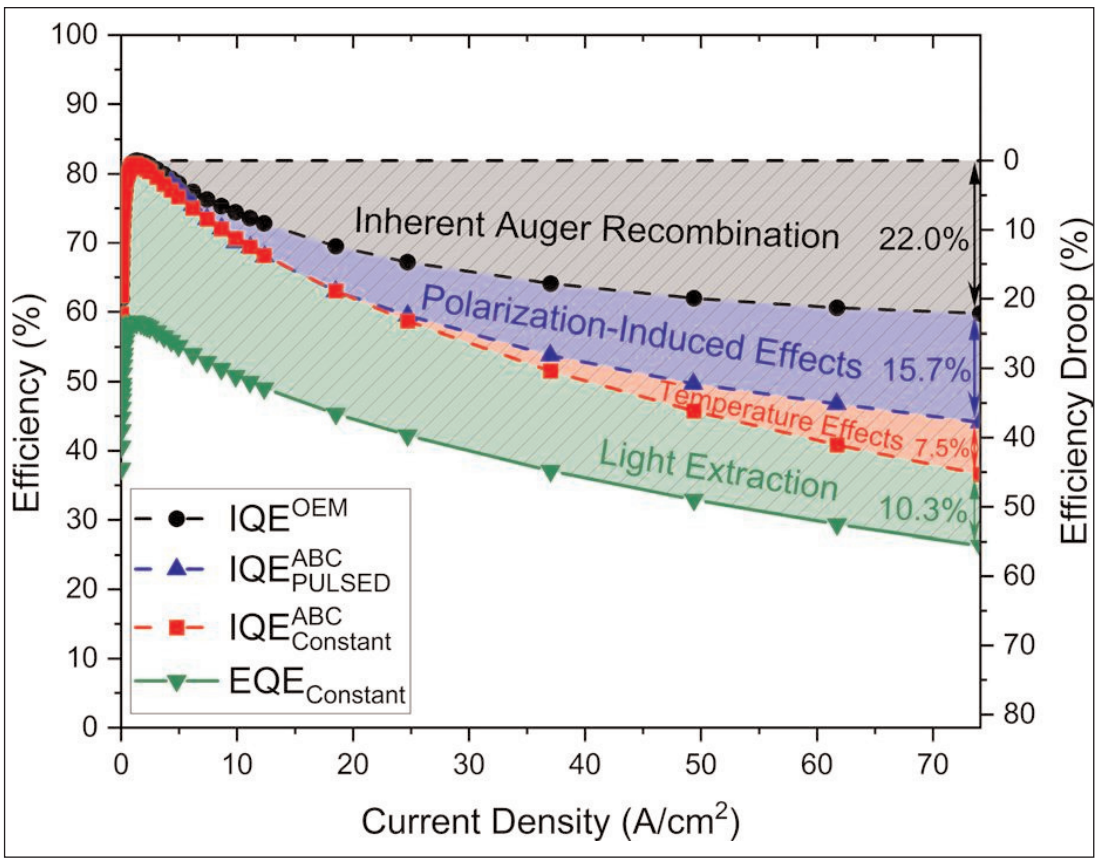


Figure 1. Green LED efficiencies as function of current density. Key: black circles, calculated internal quantum efficiency (IQE) using optical-electrical model (OEM); blue triangles, IQE under pulsed current; red squares, IQE under constant current; and, green inverted triangles; external quantum efficiency (EQE) under constant current; experimentally determined curves, solid; model derived curves, dashed.

The separation is not as clean as suggested. The indium gallium nitride (InGaN) system that is used to make blue and green LEDs has chemical bonds which are charge polarized, which introduces spontaneous and strain-dependent electric fields into multiple quantum well structures. These fields can adversely affect efficiency, complicating the analysis. The polarization effects become worse as the emission wavelength is lengthened by increasing the indium content.

The researchers report: "It is found that inherent Auger–Meitner recombination-induced droop is approximately 49% of the total efficiency droop in commercial green LEDs, while polarization-induced effects contribute about 35%, and thermal droop accounts for nearly 16%. These findings suggest, to quash the green gap, it is critical to search for materials and device designs with low inherent Auger–Meitner coefficients and polarization fields, respectively."

It is hoped to improve the efficiency of solid-state lighting by mixing red, green and blue (RGB) light from balanced LEDs, but the 'green gap' is a barrier to this. The team points out: "Current green LED wall-plug efficiency (WPE) is 19% at 100A/cm^2. To meet the Department of Energy's (DOE) goal of reducing 196 million metric tons of carbon emissions by 2035,

a WPE target of 55% has been set for green LEDs. Achieving this requires the efficiency droop contributors in InGaN green LEDs to be explored."

Using data from a Cree XLAMP XP-E2 InGaN green LED with the lens removed operated on a 25°C heating stage, the researchers estimated the contributions of various factors towards the droop effect from a modified 'ABC' model (Figure 1). At 75A/cm^2 current density, the researchers estimate that inherent Auger–Meitner recombination accounted for a 22% drop, charge-polarization effects 15.7%, thermal effects 7.5%, and light-extraction 10.3%. The Auger-polarization-thermal effects constitute the 'efficiency droop', so these contributions to the droop are estimated at 48.7%, 34.7%, and 16.6% of the total, respectively.

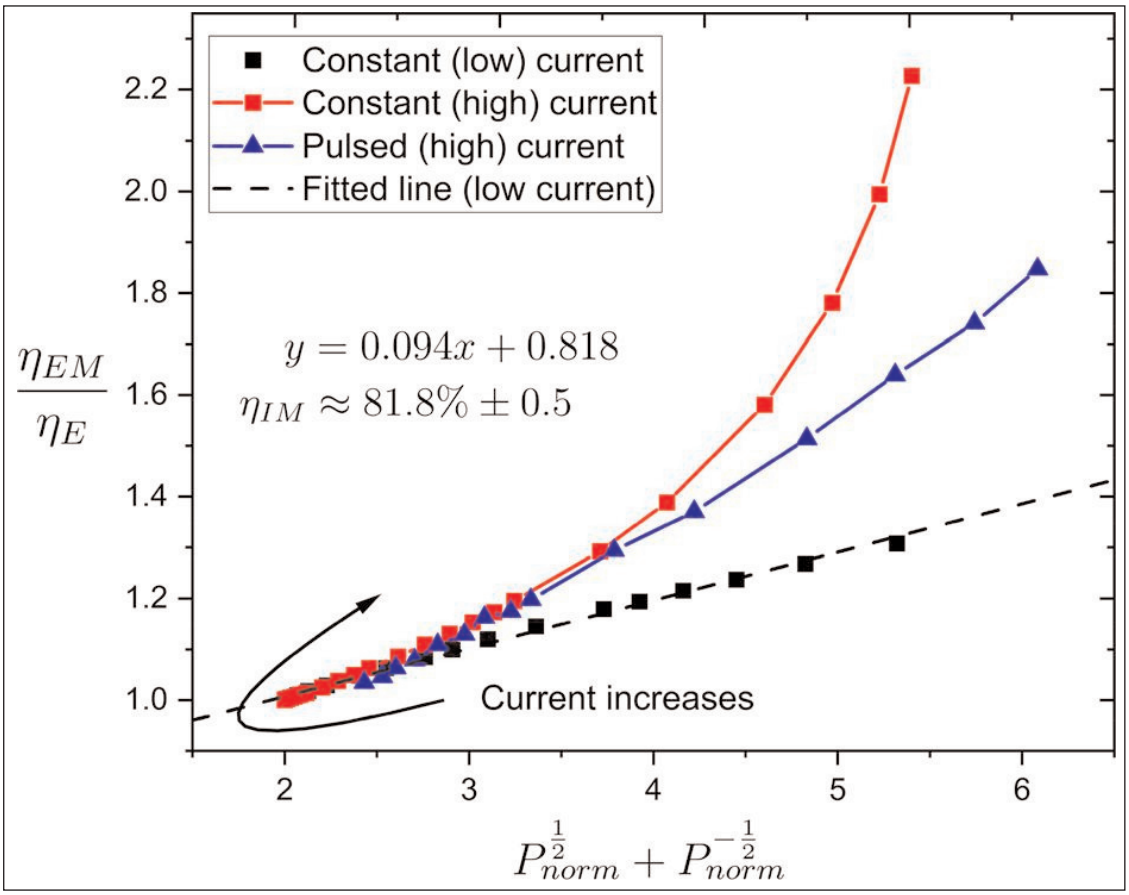


Figure 2. Inverse normalized EQE (η_{EM}/η_E) as a function of $P_{norm}^{1/2} + P_{norm}^{1/2}$.

The unmodified ABC model gives a linear relation between the inverse EQE ($1/\eta_E$) and a combination of square roots of the light output power measured in an integrating sphere (Figure 2), both normalized to their values at the maximum. The point (2,1) of the graph in Figure 2 represents the maximum of the EQE where $P_{norm} = 1$, and $\eta_E = \eta_{EM}$. The linear relation is seen to hold well for the low current side (i.e. before the maximum EQE is reached), but at high current (in the droop region) the curves become non-linear, more so when the injection is constant rather than pulsed. Pulsed measurements are typically used to reduce thermal effects on efficiency.

The linear equation in the variables $y = (\eta_{EM}/\eta_E)$ and $x = P_{norm}^{1/2} + P_{norm}^{1/2}$ is $y = \eta_{IM}(1 + x/Q)$ where η_{IM} is the internal quantum efficiency (IQE) and Q is a quality factor. The IQE can be extracted from the linear low current data as 81.8%.

The researchers used Raman spectroscopy to assess the variation of junction temperature with current injection. Assuming a typical exponential drop with temperature relative to optical power, the researchers extrapolate back to an output power without the thermal effect (P_{OEM}). The IQE_{OEM} on this optical–electrical–thermal model (OETM) can then be calculated using these power values as for the IQEs with constant and pulsed operation. ■

https://doi.org/10.1063/5.0272756

Author: Mike Cooke

Monolithic HEMT–micro-LED integration

Researchers reduce on-resistance by using a simplified fabrication process.

Southern University of Science and Technology in China has reported progress in lowering the on-resistance of indium gallium nitride (InGaN) micro-LEDs monolithically integrated with aluminium gallium nitride (AlGaN)-barrier high-electron-mobility transistors (HEMTs) as current drivers [Ran Zhang et al, IEEE Electron Device Letters, published online 19 May 2025].

The researchers reduced resistance by increasing the contact area between the micro-LED and HEMT, along with reducing the tendency to add defects during the micro-LED overgrowth process. The team sees potential for low-power-consumption mobile devices such as augmented-reality (AR) glasses, smartwatches, etc.

The micro-LED materials were selectively overgrown using metal-organic vapor phase epitaxy (MOVPE) on AlGaN/GaN HEMT templates (Figure 1). Silicon dioxide (SiO_2) was used as the mask to select the areas for the micro-LED stacks. The SiO_2 was from plasma-enhanced chemical vapor deposition (PECVD), patterned using inductively coupled plasma etch stopping at the GaN cap of the template.

The 40μm-diameter micro-LEDs consisted of up to 100nm heavily doped n++-GaN, 500nm n-GaN, 550nm InGaN/GaN multiple quantum wells (MQWs), and 150nm of p-GaN.

The researchers explain: "The regrown n-GaN functions simultaneously as the micro-LED cathode and HEMT drain. The n++-GaN layer facilitates a lower AlGaN band edge and effectively reduces the barrier height at the n-GaN/AlGaN interface."

The SiO_2 was removed by a buffered oxide etch solution before fabricating the HEMT transistor component (Figure 2). The source and drain for the HEMTs consisted of annealed titanium/aluminium/nickel/gold (Ti/Al/Ni/Au) stacks.

Further Ni/Au was used for the p-contact of the LEDs and the HEMT gate. The p-contact consisted of metal layers that were so thin (7nm/7nm) that the contact was transparent and could be used as a current-spreading layer (CSL). The gate (20nm/100nm) formed a Schottky contact with the underlying AlGaN. The gate deposition step was also used to deposit the anode and cathode contact pads of the device.

The gate was 2x78.5μm wide (approximately the circumference of a 50μm-diameter circle), and 3μm long. The gate–source and gate–drain distances were 3μm and 5μm, respectively. The HEMT delivered a

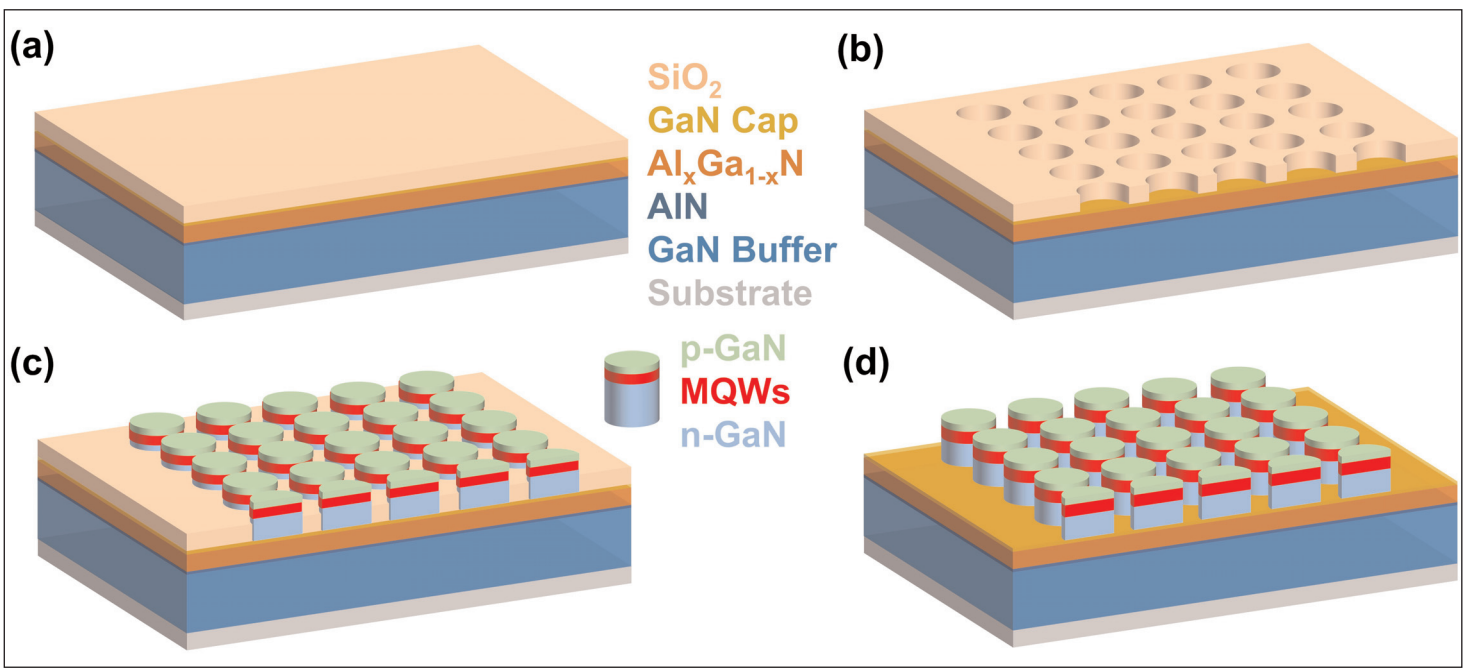


Figure 1. Monolithic integration scheme for selective area overgrowth: (a) 600nm SiO_2 deposition on GaN HEMT template, (b) patterning SiO_2 as overgrowth mask without etching HEMT material, (c) selective area overgrowth of micro-LEDs directly on HEMT surfaces, and (d) SiO_2 mask removal.

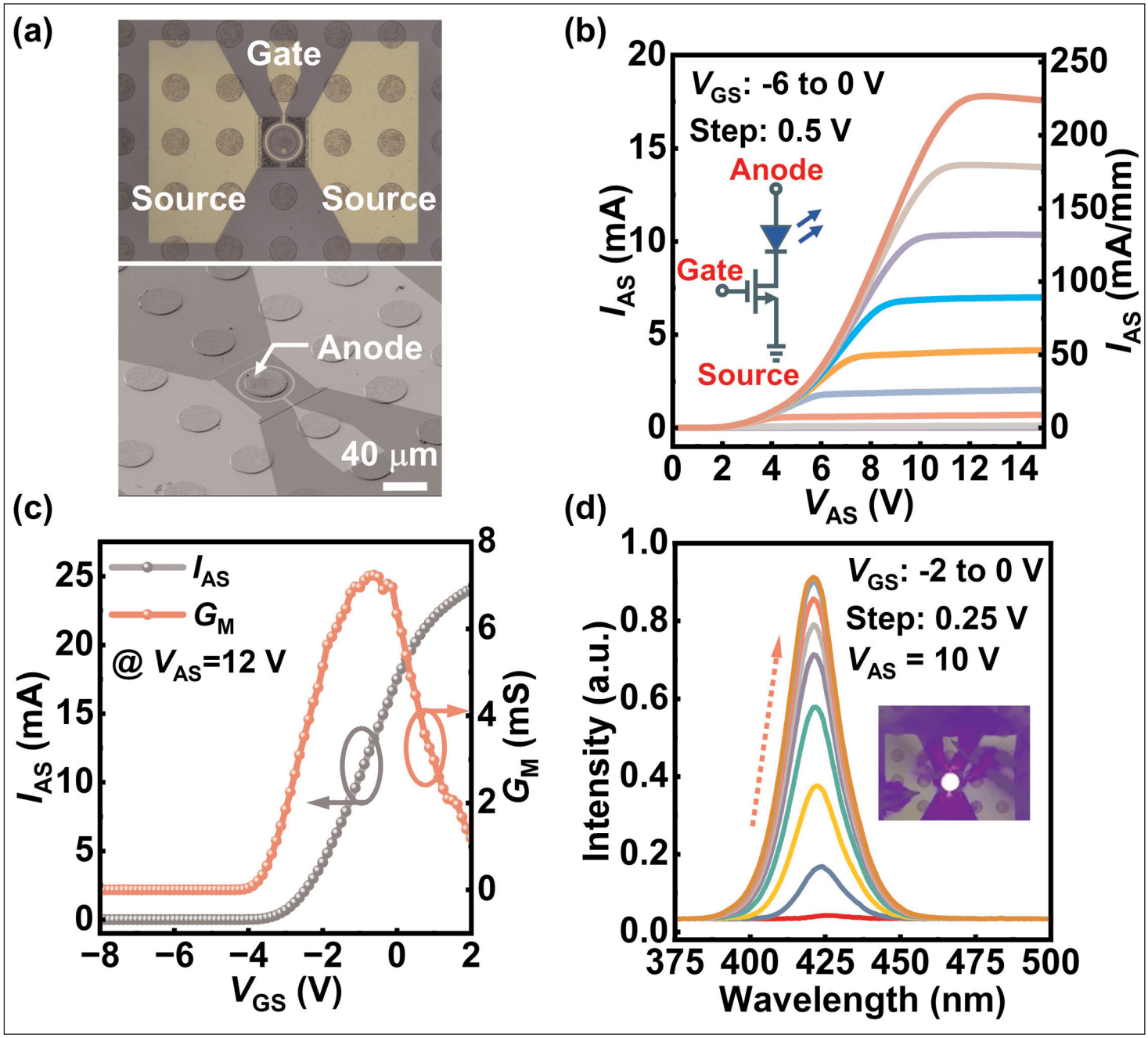


Figure 2. (a) Optical and scanning electron microscope images showing device layout, (b) output electrical characteristics, (c) transfer characteristics, and (d) electroluminescence of integrated HEMT–micro-LED devices.

maximum drain current density of 227mA/mm and a peak transconductance of 92mS/mm. The HEMT had a normally-on threshold of –4.1V. The on–off current ratio was 2.67×10^5.

The micro-LED emission wavelength was around 423nm, with a blue-shift to shorter wavelengths as the current injection increased. The blue-shift was attributed to the quantum-confined Stark effect (QCSE) on the energy levels due to the changing electric field in the wells.

The researchers compared their latest devices with those using a structure that one of the team, Yufei Cai, helped develop at the University of Sheffield, UK (Figure 3). The main difference in the Sheffield structure was that the micro-LEDs were grown on the GaN buffer layer rather than the AlGaN HEMT barrier layer. To grow the micro-LEDs on the buffer it was necessary to etch 350nm down through the overlying materials and into the buffer, creating a damaged surface on which the micro-LED materials were grown. Avoiding this step reduces fabrication complexity and potential manufacturing cost.

The team comments: "Moreover, the current injection path in the new scheme encompasses the entire two-dimensional electron gas (2DEG) contact plane, namely the whole bottom area of n-GaN of the micro-LED. In contrast, current injection is restricted to the circular ring-shaped 2DEG region at the regrown

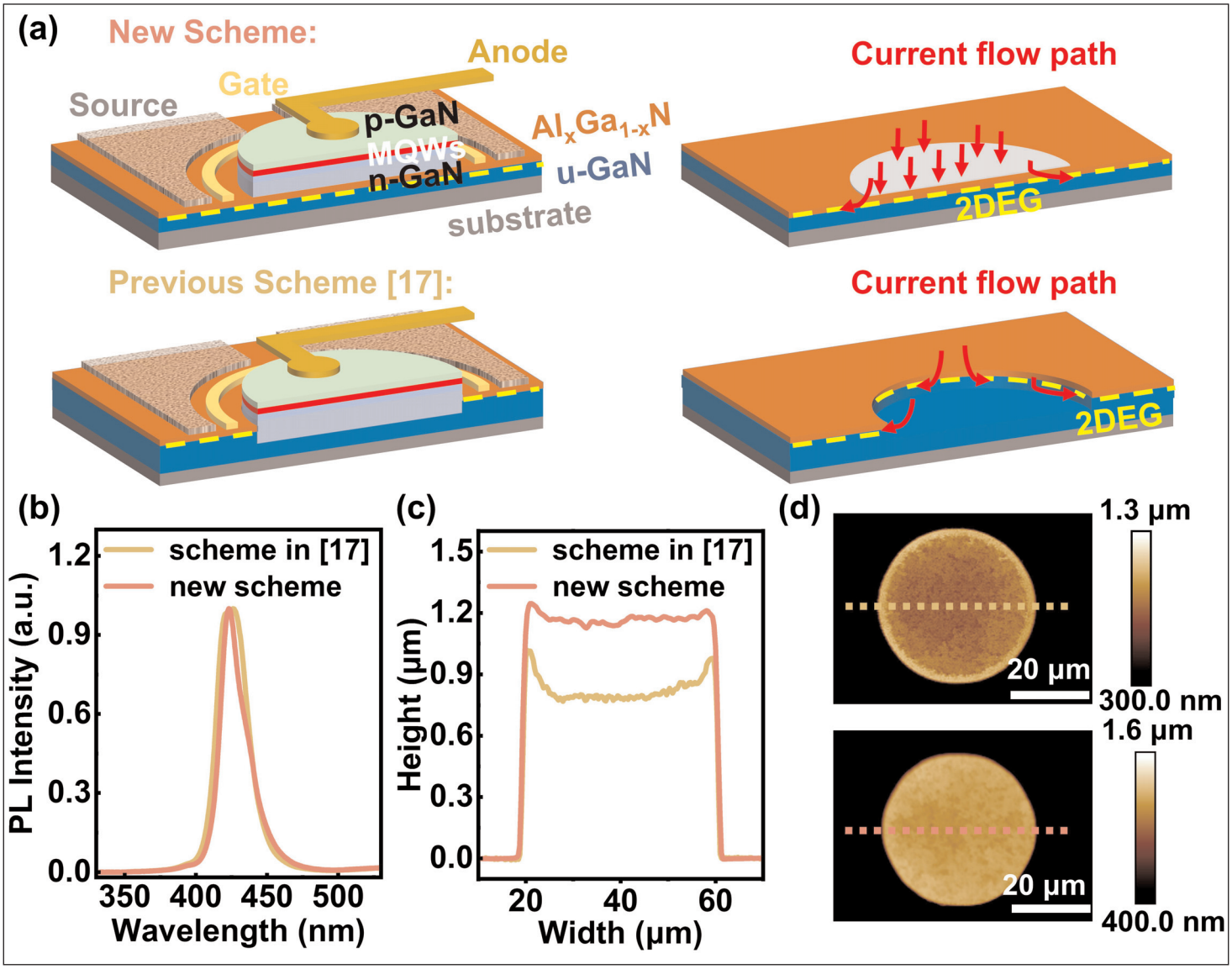


Figure 3. Comparison with previously reported integration scheme: (a) new and previous layout and current flow paths. (AlN insertion and GaN cap layers not shown for simplicity.) (b) Photoluminescence spectra, (c) surface profiles along line in (d), and (d) atomic force microscope (AFM) images of surface morphologies.

LED–HEMT contact interface for the previous approach."

The new fabrication scheme resulted in narrower photoluminescence peaks: 20.5nm compared with 24.8nm full-widths at half maximum (FWHM). The new and previous peak wavelengths were 423.2nm and 426.1nm, respectively. The researchers suggest that the narrower peaks could indicate smaller nonuniformity in both epi and quantum well thickness for the new scheme.

The researchers estimate from transmission-line model (TLM) measurements that the interface resistance between the n-GaN of the micro-LEDs and 2DEG of the HEMT channel was 0.68Ω-mm, compared with 4.8Ω-mm in the Sheffield scheme. Temperature-dependent measurements indicated that the thermionic emission was the dominant carrier transport mechanism between the 2DEG and micro-LED across the AlGaN barrier.

The researchers comment: "The thick space-charge region in the AlGaN barrier layer prevents direct tunneling, and carriers require thermal activation to overcome the interfacial potential barrier to inject into the 2DEG channel."

The on-resistances at –2V gate potential were extracted at 80Ω-mm and 314Ω-mm for the new and old schemes, respectively. The researchers see further optimization opportunities in reducing the interface resistance further, along with improving the p-GaN deposition and recessing the source contact. The team suspects that avoiding etch damage to the overgrowth surface reduced the defectivity of the micro-LED epitaxial structure, reducing power-sapping current leakage paths. ■

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Mass production QF-HVPE of GaN-on-GaN system

Researchers claim record mobilities of 1591cm^2/V-s and 18,175cm^2/V-s at room temperature (295K) and low temperature (35K), respectively.

Sumitomo Chemical Co Ltd in Japan has developed a mass-production quartz-free hydride vapor phase epitaxy (QF-HVPE) system capable of fabricating gallium nitride (GaN) with a claimed record mobility both at room temperature and low temperature [Shota Kaneki et al, Appl. Phys. Express, v18, p055502, 2025]. The material was demonstrated both on 4-inch freestanding GaN substrates and 6-inch GaN-on-sapphire templates.

The Sumitomo team was particularly concerned to reduce carbon contamination, which has been associated with mobility collapse below theoretical expectations. HVPE avoids the presence of carbon that is unavoidable in the metal-organic (MO)VPE conventionally used in growing high-quality GaN layers in mass production. Avoiding quartz (crystalline SiO_4) in the system construction enables better control of silicon (Si) doping used to achieve n-type, electron majority transport.

The team suggest that their work could lead to GaN-on-GaN power devices for applications that require breakdown voltages greater than 10kV, as needed for power drive and inverter systems used in electric vehicles and drones.

The team describes the motivation for the switch to electric-powered transportation: "Achieving carbon neutrality is strongly demanded for realizing the sustainable development goals developed in response to the rapid progression of global warming, which has led to frequent extreme weather and disasters around the world in recent years. Because thermal power generation accounts for more than 60% of the world's electricity generation, the proliferation of renewable energy and the reduction of losses through high-efficiency power conversion systems are essential to achieve carbon neutrality."

GaN has a wide bandgap that enables high breakdown voltages in semiconductor device structures.

The QF-HVPE was performed at 1050°C, giving a growth rate of 1μm/minute. This compares very favorably relative to the typical μms/hour rates for MOVPE. The Ga and N chemical elements were sourced from ammonia (NH_3) and gallium monochloride (GaCl). Dichlorosilane (H_2SiCl_2) was used for Si doping. These active components were carried to the growth front in a mix of hydrogen and nitrogen gases. The researchers grew GaN layers with a target 4x10^{15}/cm^3 silicon concentration ([Si]) on substrates with 4- and 6-inch diameters. The 4-inch substrate was freestanding GaN, while the 6-inch-diameter layer was grown on a GaN-on-sapphire template (Figure 1).

Figure 1. Six-inch GaN template on sapphire substrate fabricated using QF-HVPE system.

The researchers used secondary-ion mass spectroscopy (SIMS) to show that the mass-production QF-HVPE system eliminated carbon and oxygen contaminations as far as possible. In particular, the concentrations of these two elements was found to be below the detection limits of their analysis: 1x10^{14}/cm^3 for [C], and 5x10^{14}/cm^3 for [O]. The researchers comment that this improves on a prototype QF-HVPE system reported in early 2024 that managed to reduce carbon contamination to a just measurable 1.4x10^{14}/cm^3.

The researchers report: "Each sample exhibited almost featureless surfaces without pits or hillocks and a smooth as-grown surface with regularly arranged steps, as evaluated from an atomic force microscopy image and consistent with previous reports. Because the surface morphology directly affects the leakage current of devices, this flat surface without pits and hillocks is favorable for the stable operation of GaN devices."

According to Fourier transform infrared (FTIR) spectral analysis the layers were 14.1μm thick.

Unlike conventional HVPE, which suffers from large thickness variations, the Sumitomo researchers found that their layer thicknesses had just 3.4% standard deviation, "similar to that of an MOVPE-grown epitaxial film". The growth on the 6-inch GaN/sapphire template had a larger, but "reasonable" thickness standard deviation of 4.4%. The team reports that 6-inch freestanding GaN substrates are under development.

The excess of donors over acceptors (N_D–N_A) in the material was assessed using non-contact capacitance–voltage (C–V) measurements. Samples grown with metal-organic vapor phase epitaxy (MOVPE) had average N_D–N_A values of $4.3x10^{15}$/cm^3, compared with $6.8x10^{15}$/cm^3 for the QF-HVPE sample. The MOVPE sample suffered from a high variability of N_D–N_A with 14.3% standard deviation. By contrast the standard deviation for the QF-HVPE GaN layer on 4-inch freestanding substrate was only 3.0%. The team suggests that the problem for the MOVPE sample was the off-angle-dependent C-incorporation efficiency, based on previous work. The carbon-free nature of the QF-HVPE avoids this problem.

The control of carrier concentration was demonstrated by varying [Si] during the last 2.4μm growth in 600nm steps (Figure 2). The dependence N_D–N_A on [Si] was found to be linear over the wide range 10^{14}–10^{18}/cm^3.

The researchers comment: "Control of the carrier concentration in epitaxial layers grown by MOVPE is known to be poor when the carrier concentration is less than $1x10^{16}$/cm^3 because of C-induced carrier compensation. On the contrary, the high purity of QF-HVPE-grown layers, in which the C contaminant concentration was less than $1x10^{14}$/cm^3, led to high linearity even at carrier concentrations less than $1x10^{16}$/cm^3. Given that many power devices operate at voltages above the kilovolt range, controlling the carrier concentration in the concentration range below $1x10^{16}$/cm^3 is essential."

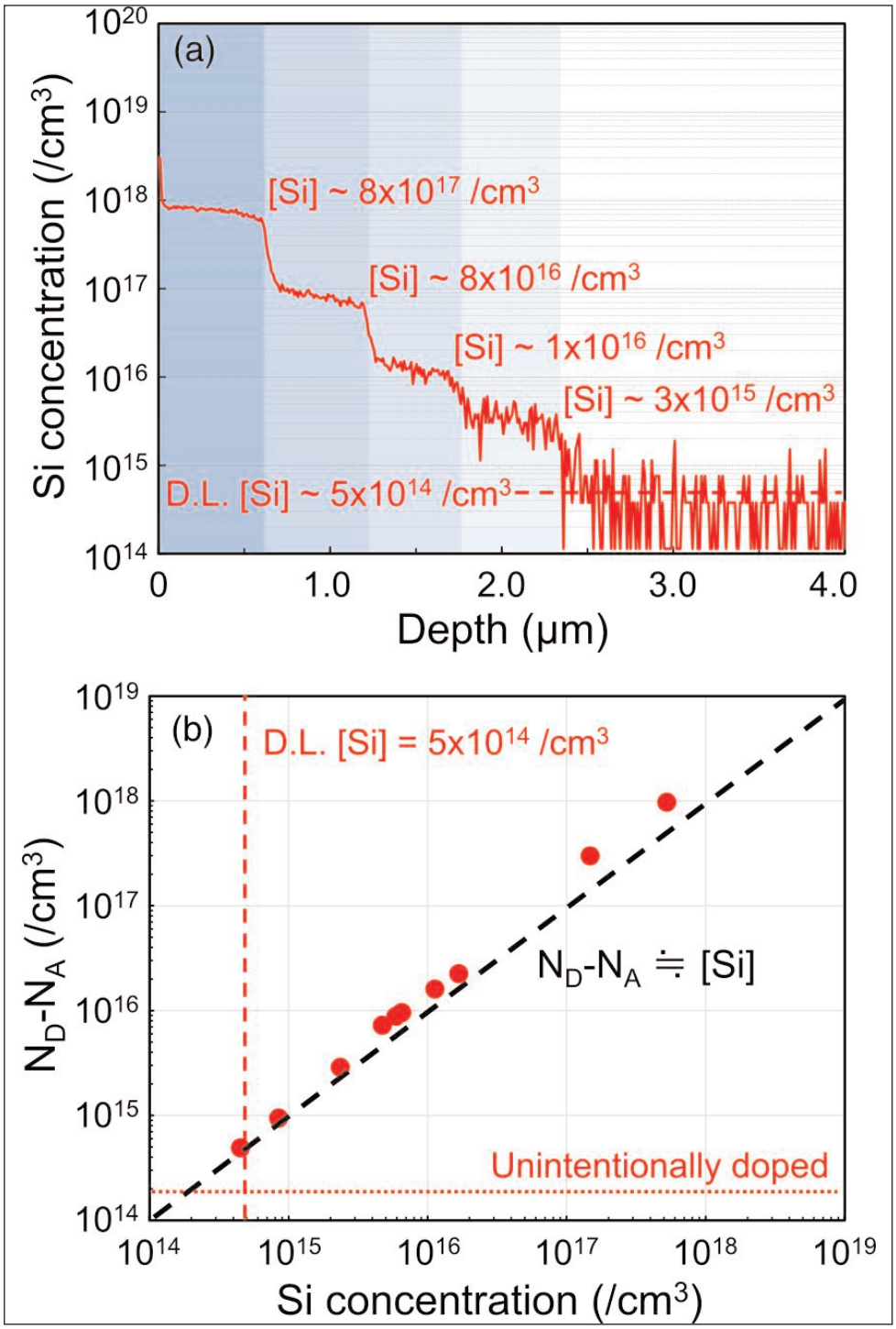

Figure 2. (a) Depth profile of [Si] obtained by SIMS analysis, [Si] varied stepwise every 600nm; epitaxial layer deeper than 2.4μm from surface was unintentionally doped. (b) Relationship between [Si] and N_D–N_A of QF-HVPE-grown layer on freestanding GaN substrate from non-contact C–V analysis.

Hall-effect measurements (Figure 3) showed record mobility values at room temperature (295K) and low temperature (35K) of 1591cm^2/V-s and 18,175cm^2/V-s, respectively.

The researchers comment: "Although various research groups, including our group, have reported an anomalous decrease of the electron mobility in GaN layers compared with the theoretical value — a phenomenon known as mobility collapse — the present data can be well fitted using the traditional mobility theory."

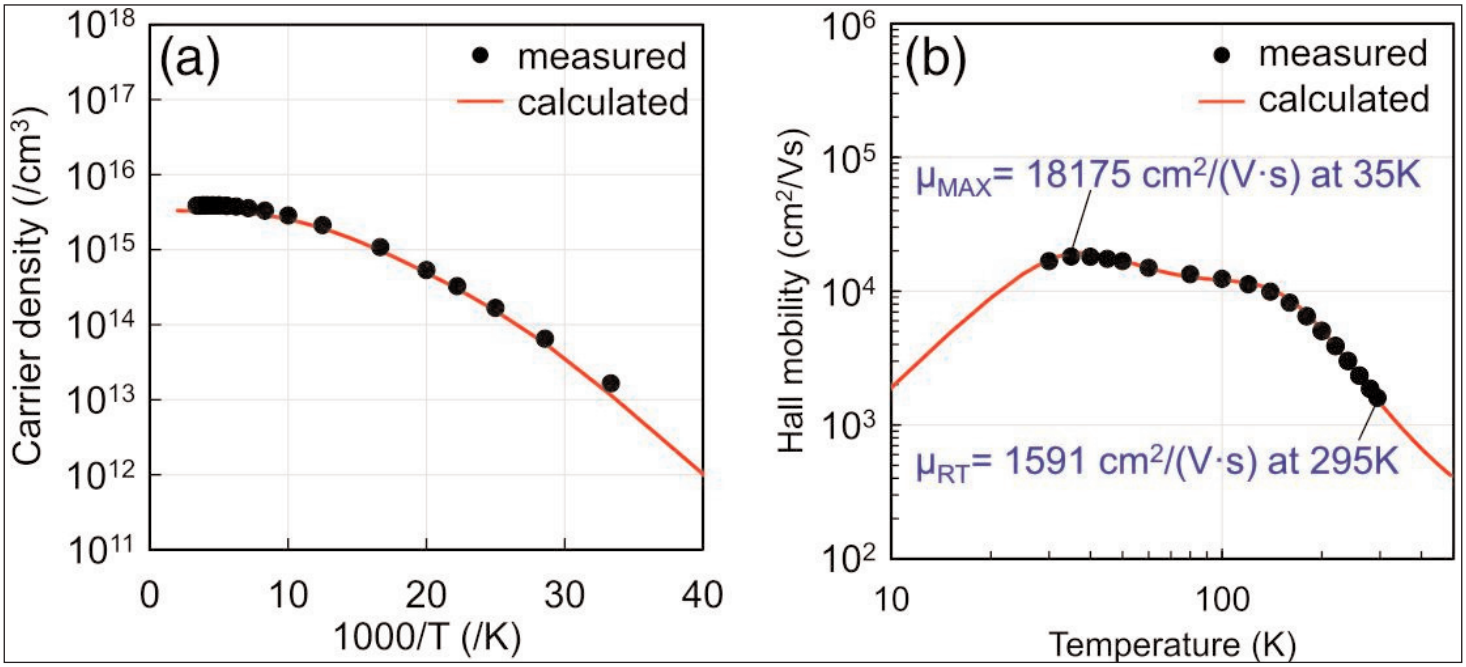

Figure 3. Measured and calculated temperature dependence of (a) carrier density and (b) Hall mobility for QF-HVPE-grown GaN bulk crystal. Black closed circles and red solid lines represent acquired data with curves fitted using traditional mobility theory.

The mobility collapse has been explained by carbon-induced scattering, and Sumitomo's results on its low [C] material supports this assertion. Photoluminescence experiments also showed spectra without blue and yellow emissions associated with carbon contamination. ■

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Singapore opens NSTIC (GaN) as first national facility for gallium nitride

A*STAR, DSO and NTU Singapore partner on the National Semiconductor Translation and Innovation Centre for Gallium Nitride.

Singapore's Minister-in-charge of Energy and Science & Technology Dr Tan See Leng has officially opened the National Semiconductor Translation and Innovation Centre for Gallium Nitride (NSTIC (GaN)) as Singapore's first national facility dedicated to gallium nitride.

First set up in 2023 as the National Gallium Nitride Technology Centre (NGTC), NSTIC (GaN) is a partnership between Singapore's Agency for Science, Technology and Research (A*STAR), DSO National Laboratories, and Nanyang Technological University, Singapore (NTU Singapore).

The center brings advanced GaN manufacturing capabilities to Singapore, aiming to position local innovators to compete in high-growth global markets such as advanced 5G and 6G communication systems, radars and satellite communications.

The center addresses common challenges faced by companies and researchers — such as limited local access to advanced facilities and the need for closer collaboration across the ecosystem — by providing industry and research collaborators with access to advanced wafer fabrication and prototyping infrastructure.

Boosting Singapore's semiconductor innovation ecosystem

NSTIC (GaN) is part of the broader National Semiconductor Translation and Innovation Centre (NSTIC) initiative led by A*STAR, which supports national efforts to deepen semiconductor R&D and innovation across priority domains such as photonics and advanced packaging.

NSTIC (GaN) was established to build national capabilities in this critical technology area, and to support companies in translating GaN innovation into real-world impact. The center will offer access to infrastructure and R&D capabilities to help startups, SMEs and MNCs to prototype, validate and scale up competitive and commercially relevant GaN-based technologies.

First national facility for both 6-inch GaN-on-SiC and 8-inch GaN-on-silicon

NSTIC (GaN) is the first facility in Singapore to host both 6-inch GaN-on-silicon carbide and 8-inch GaN-on-silicon wafer fabrication lines. This dual capability allows it to serve a wide range of applications with varying performance requirements.

It will also offer advanced GaN technology with gate length below 0.1μm and operation frequencies above 100GHz, which allows for very fast processing speeds. It is reckoned that this will place Singapore among a select group of global locations with the infrastructure to produce advanced semiconductors that will power future communication and advanced instrumentation technology.

From mid-2026, NSTIC (GaN) will begin offering commercial foundry services for prototyping and fabrication. This will enable companies to carry out advanced development work locally, reducing reliance on overseas facilities and accelerating their time-to-market, it is expected. The availability of such infrastructure in Singapore should help to lower capital and technology barriers — especially for start-ups and SMEs — and support the growth of a more self-sufficient semiconductor innovation ecosystem.

"NSTIC (GaN) is not just a facility — it is a national platform for innovation and a catalyst for future technologies," says Cheong Chee Hoo, chairman of the NSTIC (GaN) steering committee. "Our goal is to build deep capabilities in GaN manufacturing and research."

Strengthening industry collaboration and local supply chains

Industry partnerships are a key part of NSTIC (GaN)'s approach, enabling it to co-develop technologies, strengthen local capabilities, and support strategic access to critical materials.

One such collaboration involves WaferLead, a local start-up working with NSTIC (GaN) to develop high-quality silicon carbide substrates — a key component in GaN wafer production. This partnership will support the development and enhancement of wafer performance, quality and reliability, while strengthening local capabilities and Singapore's supply chain resilience.

As part of the launch, several memoranda of understanding (MoUs) and research collaboration agreements (RCAs) will be signed between NSTIC (GaN) and industry partners. These collaborations span areas

NSTIC (GaN) provides companies with access to industry-grade infrastructure to accelerate prototyping and commercialization.

such as substrate development, high-frequency circuit design, advanced packaging, and fabrication process enhancement.

Developing a pipeline of local semiconductor talent

NSTIC (GaN) plays a strategic role in developing a pipeline of local semiconductor talent. Through partnerships with Singapore's Institutes of Higher Learning (IHLs), it offers students and researchers early exposure to industry-grade infrastructure and processes, equipping them with practical experiences in the semiconductor sector.

The center also supports PhD training programs in collaboration with IHLs and industry, helping to deepen translational research capabilities in GaN technologies. These efforts are critical to ensuring that Singapore has the talent base needed to support the growth of its deep-tech innovation ecosystem, it is reckoned. ■

www.a-star.edu.sg/ime/Research/power-electronics
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Low-cost, scalable process for integrating GaN transistors onto silicon CMOS chips

An MIT-led team shows how Intel 16 22nm FinFET metallization and passive options enable the incorporation of components such as neutralization capacitors.

Gallium nitride (GaN) will likely be key for the next generation of high-speed communication systems and the power electronics needed for state-of-the-art data centers, but its high cost and the specialization required to incorporate it into conventional electronics have limited its use in commercial applications, notes the USA's Massachusetts Institute of Technology (MIT).

Now, researchers from MIT and elsewhere have developed a new fabrication process that integrates high-performance GaN transistors onto standard silicon CMOS chips in a way that is low-cost and scalable, and compatible with existing semiconductor foundries.

Their method involves fabricating many transistors on the surface of a GaN chip, cutting out each individual transistor, and then bonding just the necessary number of transistors onto a silicon chip using a low-temperature process that preserves the functionality of both materials.

The cost is minimal, since only a small amount of GaN material is added to the chip, but the resulting device can gain a significant performance boost from compact, high-speed transistors. In addition, by separating the GaN circuit into discrete transistors that can be spread over the silicon chip, the new technology is able to reduce the temperature of the overall system.

The researchers used this process to fabricate a power amplifier that achieves higher signal strength and efficiencies than devices consisting of silicon transistors. In a smartphone, this could improve call quality, boost wireless bandwidth, enhance connectivity, and extend battery life, it is reckoned.

Because their method fits into standard processes, it could improve existing electronics as well as future technologies. In the future, the new integration scheme could even enable quantum applications, as gallium nitride performs better than silicon at the cryogenic temperatures essential for many types of quantum computing.

"If we can bring the cost down, improve the scalability and, at the same time, enhance the performance of the electronic device, it is a no-brainer that we should adopt this technology," says Pradyot Yadav, an MIT graduate student and lead author of a paper on this method. "We've combined the best of what exists in silicon with the best possible gallium nitride electronics. These hybrid chips can revolutionize many commercial markets."

He is joined on the paper by fellow MIT graduate students Jinchen Wang and Patrick Darmawi-Iskandar; MIT postdoc John Niroula; senior authors Ulrich L. Rohde, a visiting scientist at the Microsystems Technology Laboratories (MTL), and Ruonan Han, an associate professor in the Department of Electrical Engineering and Computer Science (EECS) and member of MTL; and Tomás Palacios, the Clarence J. LeBel Professor of EECS, and director of MTL; as well as collaborators at Georgia Tech and the Air Force Research Laboratory. The research was presented in the paper 'RTu2C-4: 3D-Millimeter Wave Integrated Circuit (3D-mmWIC): A Gold-Free 3D-Integration Platform for Scaled RF GaN-on-Si Dielets with Intel 16 Si CMOS' at the 2025 IEEE Radio Frequency Integrated Circuits Symposium (IMS) in San Francisco, CA, USA (15–17 June).

Swapping transistors

Gallium nitride is the second most widely used semiconductor after silicon, and its unique properties suit applications such as lighting, radar systems and power electronics. But to access its maximum performance, it is important for GaN chips to be connected to digital chips made of CMOS silicon.

To enable this, some integration methods bond GaN transistors onto a CMOS chip by soldering the connections, but this limits how small the GaN transistors can be. The smaller the transistors, the higher the frequency at which they can work.

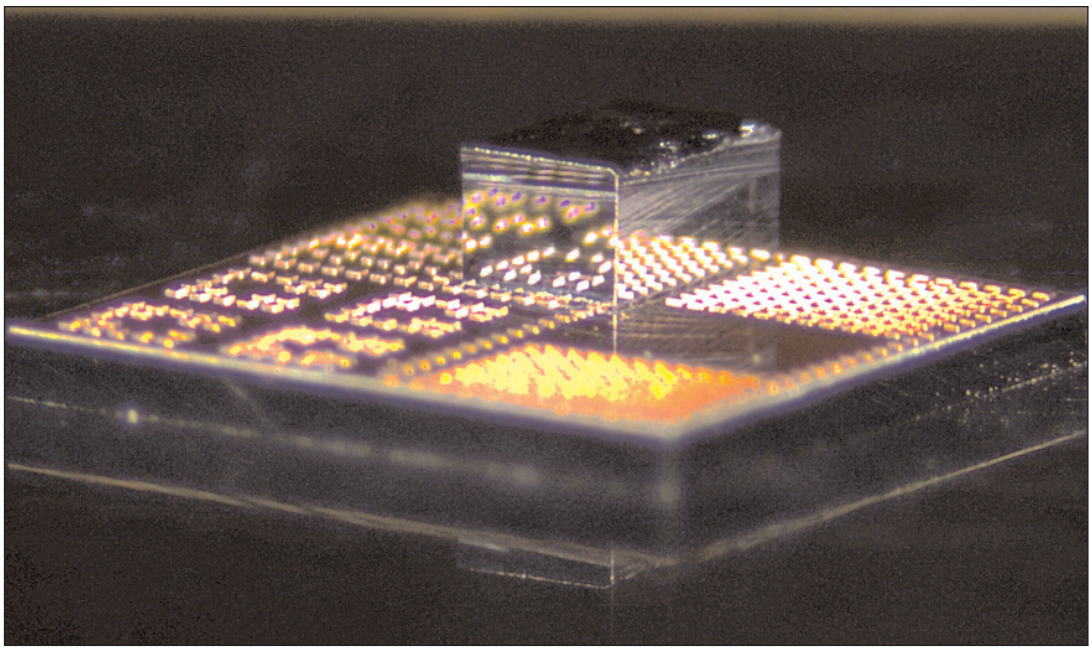
Other methods integrate an entire GaN wafer onto a silicon wafer, but using so much material is extremely costly, especially since the GaN is only needed in a few small transistors. The rest of the material in the GaN wafer is wasted.

"We wanted to combine the functionality of GaN with the power of digital chips made of silicon, but without having to compromise on either cost or bandwidth. We achieved that by adding super-tiny discrete gallium nitride transistors right on top of the silicon chip," Yadav says.

The new chips are the result of a multi-step process.

First, a tightly packed collection of transistors is fabricated across the entire surface of a GaN wafer. Using very fine laser technology, they cut each one down to just the size of the transistor, which is 240μm x 410μm, forming a dielet.

Each transistor is fabricated with copper pillars on top, to bond directly to the copper pillars on the surface of a standard silicon CMOS chip. Copper-to-copper bonding can be performed at temperatures below 400°C, which is low enough to avoid damaging either material.



A new fabrication process integrates high-performance GaN transistors onto standard silicon CMOS chips in a way that is low-cost and scalable.

Existing GaN integration techniques require bonds that use expensive gold material, which needs much higher temperatures and stronger bonding forces than copper. Since gold can contaminate the tools used in most semiconductor foundries, it typically requires specialized facilities.

"We wanted a process that was low-cost, low-temperature and low-force, and copper wins on all of those related to gold. At the same time, it has better conductivity," Yadav notes.

A new tool

To enable the integration process, the researchers created a specialized new tool that can carefully integrate the extremely small GaN transistor with the silicon chips. The tool uses a vacuum to hold the dielet as it moves on top of a silicon chip, zeroing in on the copper bonding interface with nanometer precision.

They used advanced microscopy to monitor the interface and then, when the dielet is in the right position, they apply heat and pressure to bond the GaN transistor to the chip.

"For each step in the process, I had to find a new collaborator who knew how to do the technique that I needed, learn from them, and then integrate that into my platform. It was two years of constant learning," Yadav says.

Once the researchers had perfected the fabrication process, they demonstrated it by developing power amplifiers for boosting wireless signals. Their devices achieved higher bandwidth and better gain than devices made with traditional silicon transistors. Each compact chip has an area of less than half a square millimeter.

In addition, because the silicon chip they used in their demonstration is based on Intel 16 22nm FinFET metallization and passive options, they were able to incorporate components often used in silicon circuits, such as neutralization capacitors. This greatly improved the gain of the amplifier, bringing it one step closer to enabling the next generation of wireless technologies.

"To address the slowdown of Moore's Law in transistor scaling, heterogeneous integration has emerged as a promising solution for continued system scaling, reduced form factor, improved power efficiency, and cost optimization," says Atom Watanabe, an IBM research scientist who was not involved with the published paper. "Particularly in wireless technology, the tight integration of compound semiconductors with silicon-based wafers is critical to realizing unified systems of front-end integrated circuits, baseband processors, accelerators and memory for next-generation antennas-to-AI platforms," he adds. "This work makes a significant advancement by demonstrating 3D integration of multiple GaN chips with silicon CMOS and pushes the boundaries of current technological capabilities."

This work is supported, in part, by the US Department of Defense through the National Defense Science and Engineering Graduate (NDSEG) Fellowship Program and CHIMES, one of the seven centers in JUMP 2.0, a Semiconductor Research Corporation Program by the Department of Defense and the Defense Advanced Research Projects Agency (DARPA). Fabrication was carried out using facilities at MIT.Nano, the Air Force Research Laboratory, and Georgia Tech. ■

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AlYN-barrier GaN HEMTs for next generation devices

Researchers demonstrate low subthreshold swing and high on/off current ratio.

Cornell University in the USA and Germany's Fraunhofer Institute for Applied Solid State Physics IAF have reported the use of aluminium yttrium nitride (AlYN) as a potential barrier material for gallium nitride (GaN) two-dimensional electron gas (2DEG) channel high-electron-mobility transistors (HEMTs) [Kazuki Nomoto, Appl. Phys. Lett., v126, p223509, 2025].

The team comments: "Using regrown n-GaN Ohmic contacts to the polarization-induced 2DEG, excellent HEMT DC performance with a low threshold voltage, a saturation drain current exceeding 400mA/mm, and a transconductance greater than 300mS/mm are obtained."

The researchers also report "near-ideal subthreshold swing minimum values of ~66–67mV/decade, highlighting excellent electrostatic gate control of the 2DEG channel conductivity due to a low interface trap density."

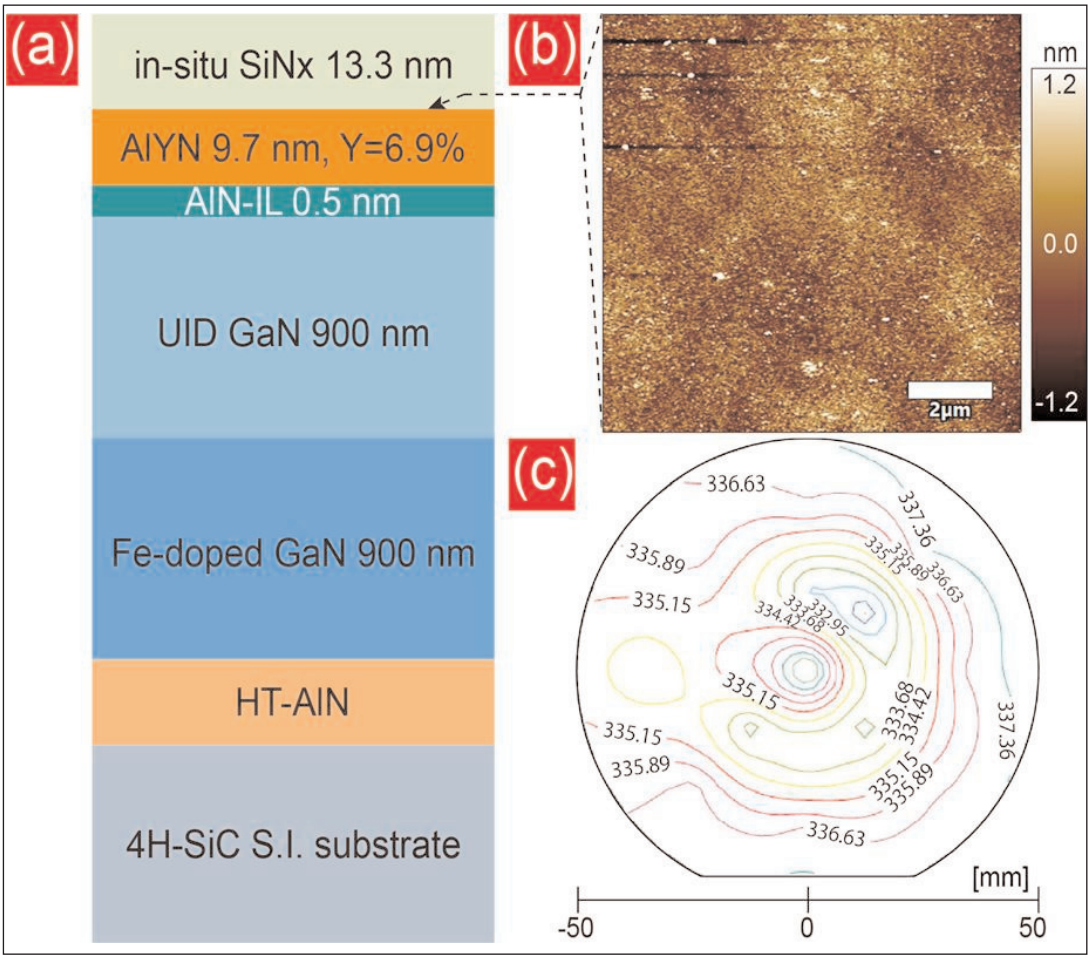

Figure 1. (a) Epitaxial AlYN/GaN MOCVD heterostructure. (b) Atomic force microscope (AFM) image of AlYN surface after removal of in situ silicon nitride (SiN_x) by wet-etching. (c) Sheet resistance map across 100mm wafer.

The group sees such performance as potentially leading to high-efficiency, and high-frequency applications in next-generation wireless communication and power electronics systems.

Although yttrium does not fall in the traditional group III periodic table column sequence (boron (B), aluminium, gallium, indium,…), like them it has three electrons in the outermost shell. In fact, yttrium falls in the d-block of transition metals, and in modern period table terms is in group 3, while the traditional group III is put in group 13. Another group 3 elements is scandium (Sc), which also has seen implementation in research HEMTs in recent times. Lanthanum (La), the first f-block element (rare earths) also has three electrons in the outer shell, and has been subject to similar HEMT research exploration. The f-block elements do not have official group numbers.

In order to make an impact for future HEMTs these materials need to maintain high channel mobility, while improving breakdown and scaling characteristics. The breakdown voltage is related to the bandgap, so one needs larger bandgaps than that of present-day AlGaN-barrier devices. The Cornell, Fraunhofer and other groups have variously realized AlBN- and AlScN-barrier GaN HEMTs.

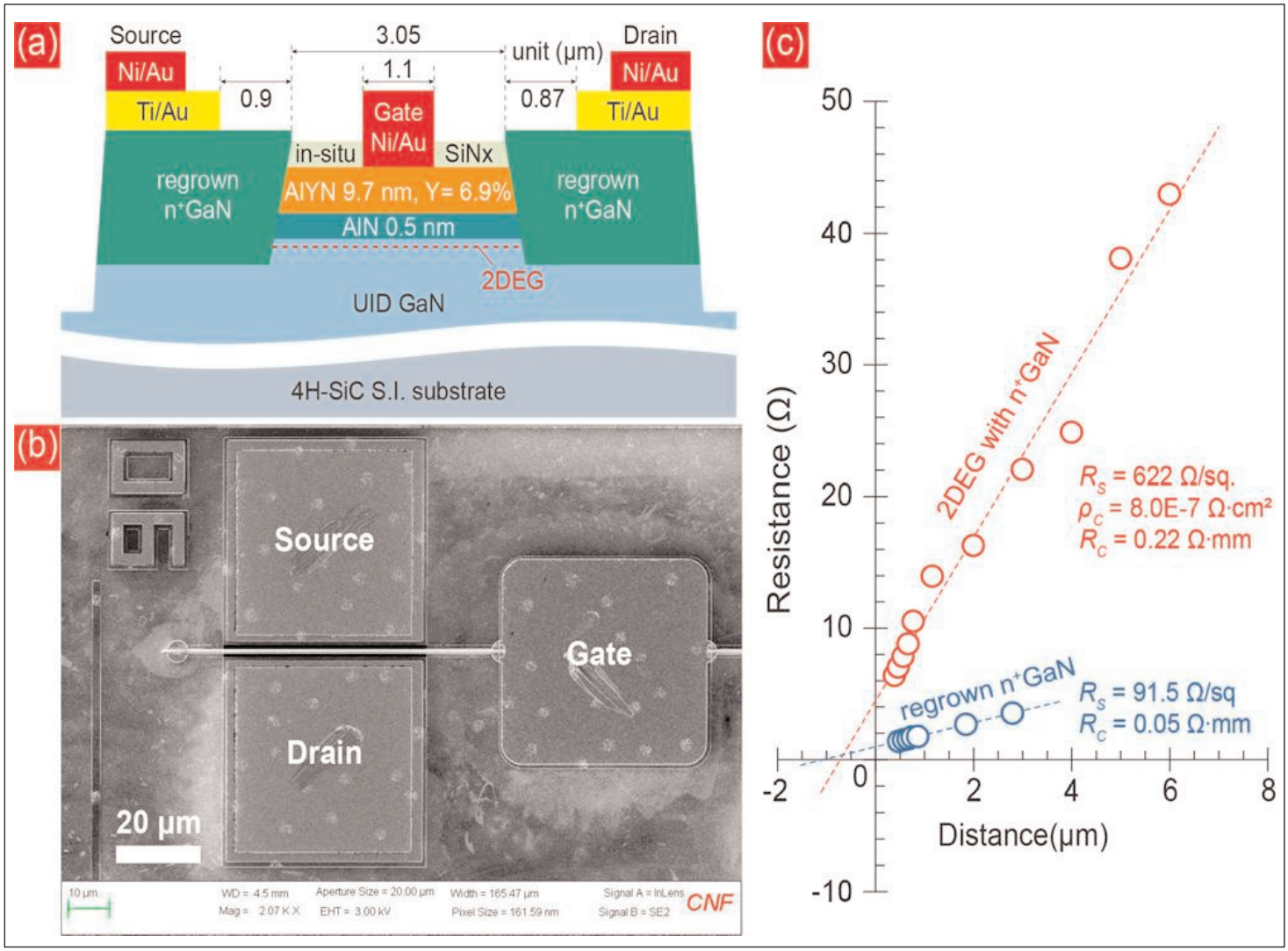

Figure 2. (a) Schematic cross section of HEMT. (b) Post-fabrication top-view scanning electron microscope (SEM) image. (c) Total resistance versus transmission line method (TLM) structure, showing contact and sheet resistances of regrown region and 2DEG channel.

The epitaxial material structure (Figure 1) was grown by metal-organic chemical vapor deposition on 100mm-diameter semi-insulating (S.I.) 4H-polytype (0001) silicon carbide (SiC) substrate. The 9.7nm AlYN layer used solid tris(methylcyclopentadienyl)yttrium ($(MCp)_3Y$), supplied by Dockweiler Chemicals, for the Y precursor.

The nucleation on the SiC was aluminium nitride (AlN) grown at high temperature (HT), followed by 900nm iron (Fe)-doped GaN lower buffer designed to compensate for residual donor impurities in the 900nm unintentionally doped (UID) upper buffer.

The AlYN barrier was grown on a thin AlN interlayer (IL) to improve barrier homogeneity. The epitaxial structure was completed by depositing SiN_x for passivation of the AlYN surface. In particular the SiN_x protected the Al-containing surface material from oxidation. AFM measurements over a 10μmxμm area with the SiNx removed showed a root mean square (RMS) surface roughness of 0.67nm. The sheet resistance was around 335Ω/❑. The electron mobility in the two-dimensional electron gas (2DEG) that formed near the barrier/buffer interface was 1358cm^2/V-s with electron density 1.37x10^{13}/cm^2.

The HEMTs (Figure 2) were fabricated with regrown source/drain n^+-GaN contacts with titanium/gold (Ti/Au) metal electrodes. The gate and contact pads consisted of nickel/gold layers. The ~50nm-thick source/drain GaN regions were grown by molecular beam epitaxy (MBE).

The researchers believe that the rather high contact resistances from the metal/regrown GaN and regrown/2DEG GaN interfaces can be reduced in future work. Hall measurements probing the 2DEG with regrown Ohmic contacts gave 0.95x10^{13}/cm^2 carrier density, 1360cm^2/V-s mobility, and 481Ω/❑ sheet resistance. The reduction in carrier density, and associated increase in sheet resistance, were attributed to the source/drain regrowth. A control HEMT sample fabricated without regrown source/drain contacts showed no significant change in Hall properties from the values after MOCVD.

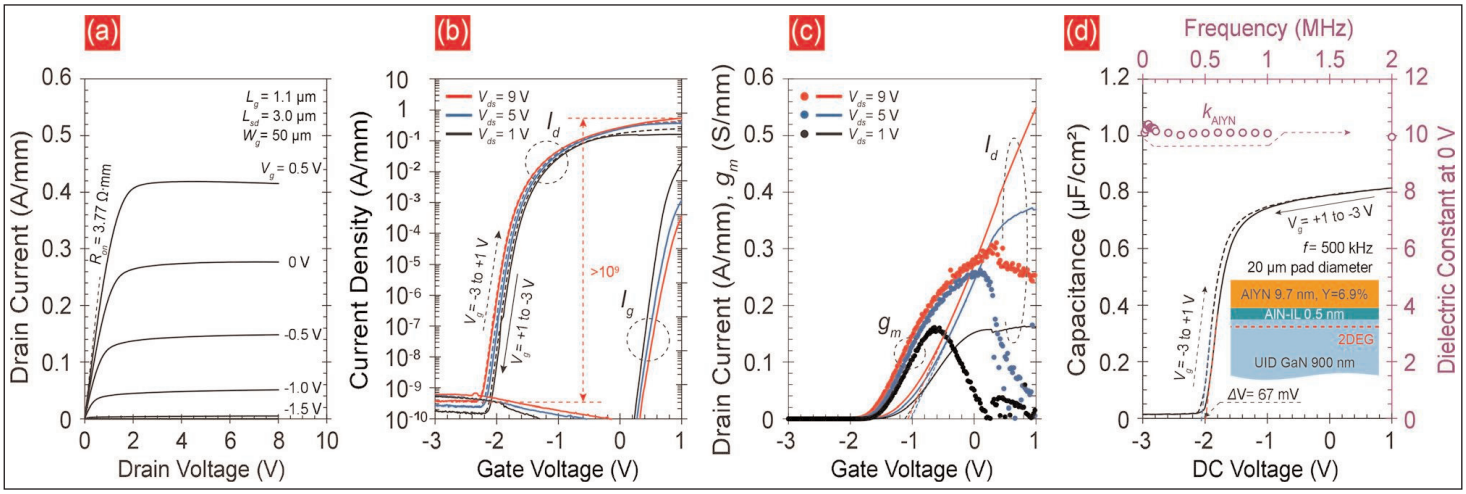

Figure 3. (a) Measured DC output. (b) Log scale and (c) linear scale transfer characteristics. (d) Measured capacitance–voltage (C–V) characteristics of AlYN/AlN/GaN-based metal-insulator-semiconductor (MIS) capacitor at 500kHz, and extracted dielectric constant across 10kHz–2MHz frequency range.

The researchers comment: "This suggests that the changes in sheet charge density are associated with specific steps involved in the regrowth process and post-regrowth treatments. The potential reasons could be due to the high temperature needed for regrowth and associated changes in strain in the barrier."

Although the exact causes of the sheet resistance increase have not been determined as yet, the team was encouraged that the mobility was effectively unchanged.

The fabricated AlYN-barrier HEMTs showed a maximum saturated drain current of 0.42A/mm at 0.5V gate potential (Figure 3). The on-resistance was 3.77Ω-mm. Gate voltage sweeps showed a drain-induced barrier lowering (DIBL) of around 9mV/V. The on/off current ratio was more than 10^9.

For negative gate potentials the gate current leakage was less than 1nA/mm, "indicating that the AlYN barrier layer is highly effective in restricting gate leakage current to allow effective gate modulation of the AlYN/GaN HEMT," according to the team.

The threshold variation was −1.12V, −1.03V and −1.05V for drain biases of 1V, 5V and 9V, respectively. The peak extrinsic transconductance at 9V drain was 0.31S/mm. Capacitance measurements on MIS structures with 20μm-diameter nickel/gold pads showed relative dielectric constants of more than 10.

The researchers see their results as showing AlYN to be "an effective epitaxial gate dielectric with a decent relative dielectric constant that can simultaneously provide polarization-induced 2DEGs and appropriate insulating properties to serve as the gate barrier of AlYN/AlN/GaN HEMTs."

In addition, the devices show subthreshold swings (SSs) down to just above 66mV/decade, near the room-temperature Boltzmann theoretical SS limit of 60mV/decade. In downward sweeps the lowest SS was 67.2mV/decade around 10^{-4}A/mm, relatively independent of drain bias. For upward sweeps there was some dependence on bias, but slightly lower SS values were recorded around 66.5mV/decade for 1V bias.

The team comments: "These SS values indicate an interface trap density of D_{it} = 8x10^{11}/cm^2-eV. The low SS values, even at high drain bias voltages, indicate that AlYN can serve as an attractive epitaxial barrier layer for the next generation of GaN HEMTs." ■

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High-breakdown normally-off gallium oxide transistors

Researchers claim record for β-Ga_2O_3 MOSFETs on silicon substrate.

Saudi Arabia's King Abdullah University of Science and Technology (KAUST) has claimed record breakdown voltages for normally-off beta-phase gallium oxide (β-Ga_2O_3) metal-oxide field-effect transistors (MOSFETs) on gallium nitride (GaN) on silicon substrate [Mritunjay Kumar et al, Appl. Phys. Lett., p126, p193505, 2025].

The reported maximum reverse-bias breakdown was measured at 540V, the highest among previously reported studies on breakdown voltage of β-Ga_2O_3 MOSFETs on silicon substrates, according to the KAUST team. The β-Ga_2O_3 material is presently in the laboratory phase of its device development, and the ultimate breakdown capability enabled by the 4.9eV ultrawide bandgap is presumably some way off. This bandgap should be able to sustain electric fields up to 8MV/cm. Commercial advanced power handling materials include GaN and silicon carbide (SiC) with wide bandgaps up to 3.4eV.

The researchers comment: "Despite advancements in β-Ga_2O_3 thin-film growth technology via various growth methods on heterogeneous substrates, there is no demonstration of β-Ga_2O_3 power MOSFETs utilizing GaN buffer-on-Si substrates."

The use of low-cost, commercially available GaN/Si substrates is seen as being "significant for high performance and their monolithic integration with GaN devices in future power integrated circuits". In particular, more thermally conductive GaN on Si could ease the temperature management problems of β-Ga_2O_3. Other options for thermally conductive substrates include SiC, but these substrates are very costly.

In addition to power handling, the KAUST team suggests that the combination with GaN could enable β-Ga_2O_3 radio frequency devices for power switching and RF amplification systems.

The researchers explain: "Given β-Ga_2O_3's higher breakdown voltage compared to GaN, it complements GaN's superior mobility. This allows high-speed control circuitry to be implemented with GaN technology, while high-power devices are realized using β-Ga_2O_3, leveraging both technologies to develop monolithic power-integrated circuits (ICs)."

The researchers used an economical and scalable β-Ga_2O_3 growth technique: pulsed laser deposition (PLD).

TFTs (Figure 1) were fabricated on 50nm β-Ga_2O_3 layers on 4.7μm GaN on p-Si(111) substrates. The β-Ga_2O_3 was doped with silicon to give an n-type electron majority carrier character. The semi-insulating GaN buffer contained a carbon doping concentration of $5x10^{19}/cm^3$.

The β-Ga_2O_3 layers were grown by 700°C PLD with a 102mJ/pulse laser ablating Ga at 5Hz in an environment with oxygen at 5mTorr partial pressure. The electron transport properties gave $1.2x10^{18}/cm^3$ electron concentration and $2.06cm^2$/V-s mobility from Hall-effect measurements.

The researchers comment: "The relatively low bulk mobility of the epitaxial β-Ga_2O_3 film is primarily due to its polycrystalline nature, and lattice-mismatch-induced defects from growth on GaN/Si substrates."

The team suggest that mobility could be enhanced by deploying metal-organic chemical vapor deposition (MOCVD) growth rather than PLD. With post-deposition annealing this would increase crystallinity and decrease defect density.

The surface roughness of the β-Ga_2O_3 was 0.57nm, doubling the 0.23nm of the underlying GaN substrate, according to atomic force microscopy (AFM) on a

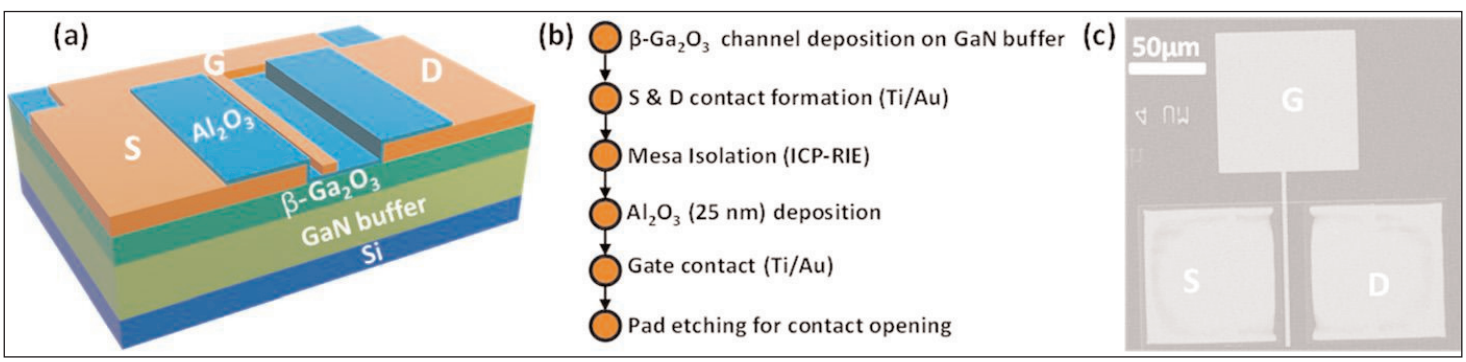

Figure 1. β-Ga_2O_3 TFT device structure: (a) three-dimensional (3D) schematic, (b) process flow, (c) scanning electron microscope (SEM) image.

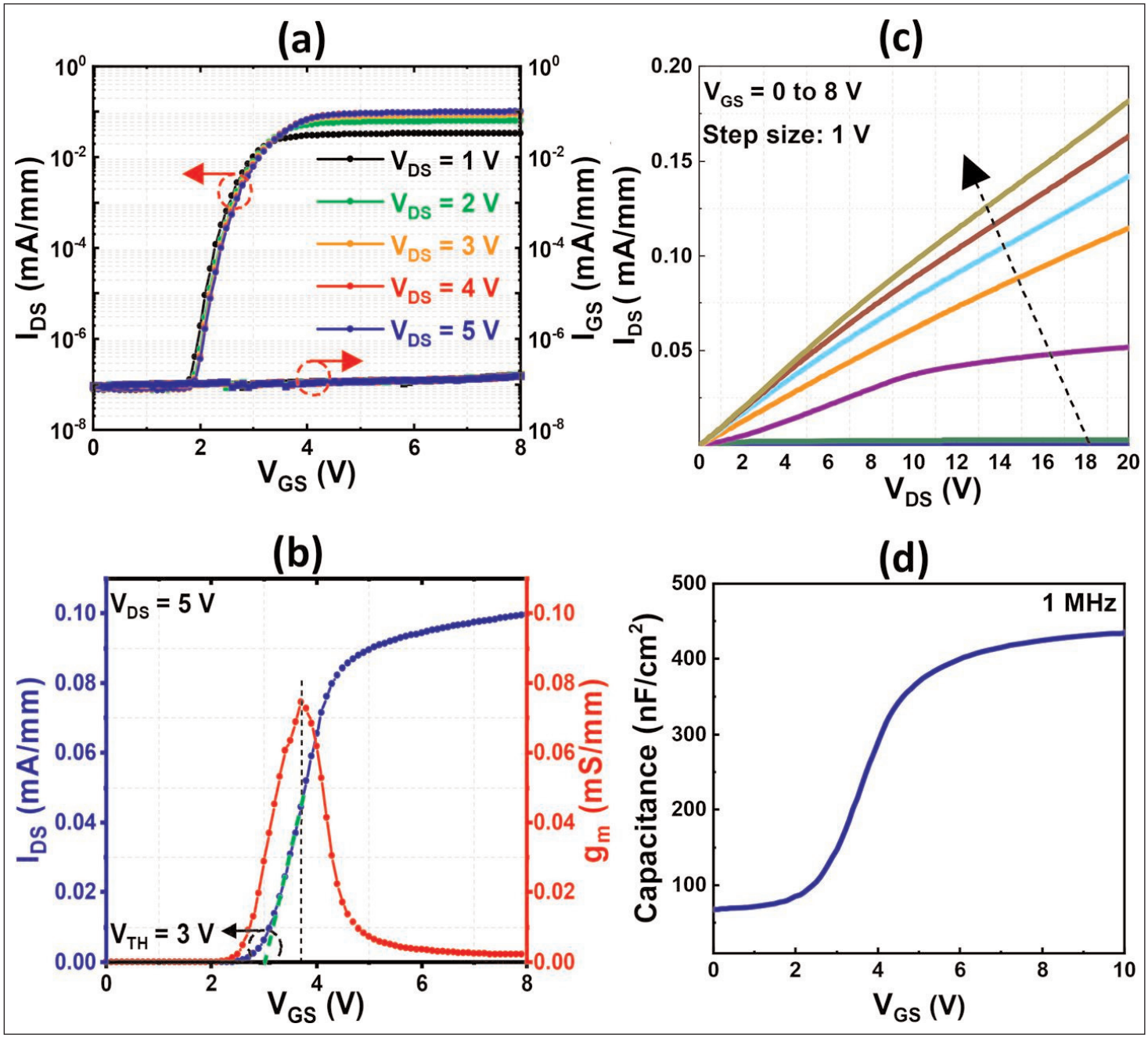

Figure 2. Electrical characteristics: (a) current-gate voltage transfer (I_{DS}–V_{GS}) at different V_{DS}, (b) V_{TH} calculation by linear extrapolation at transconductance (g_m) maximum, (c) output characteristics at different V_{GS}, (d) capacitance–voltage (C–V) measurement at 1MHz.

5μmx5μm field.

The source/drain (S/D) electrodes of the TFTs consisted of titanium/gold (Ti/Au). The gate (G) structure consisted of 25nm aluminium oxide (Al_2O_3) dielectric and Ti/Au electrodes. The gate length (L_g) was 4μm; and, the S (L_{SG}) and D (L_{GD}) distances to the gate were 3μm and 18μm, respectively.

The TFTs demonstrated a low 167mV/decade sub-threshold swing (SS) and high 10^6 on/off current ratio (Figure 2). The team comments: "The low SS for the fabricated device indicates a high-quality interface between β-Ga_2O_3 and Al_2O_3."

The interface trap density (D_{it}) was estimated to be $4x10^{12}$/cm^2-eV, using capacitance–voltage measurements.

The Al_2O_3 dielectric enabled a small gate leakage of order 10_7mA/mm at 8V forward gate potential. The transistor threshold was at +3V at 5V V_{DS}, giving enhancement-mode (normally-off) behavior. Such behavior is favored for fail-safe power system operation.

The researchers comment: "The positive V_{TH} of β-Ga_2O_3 MOSFETs is contributed by both the top-side and bottom-side depletion, along with possible phase-induced insulating regions near the β-Ga_2O_3/GaN interface."

The team reports that the threshold point can be controlled by the β-Ga_2O_3 layer thickness.

A field-effect mobility of 1cm^2/V-s was extracted from transconductance measurement, using a transistor

Table 1. Electrical parameter comparison of reported β-Ga_2O_3 TFTs on heterogeneous substrate. KAUST work in bold.

Material preparation method	Substrate	V_{TH} (V)/operation mode	R_{on} (kΩ-mm)	I_{on}/I_{off}	V_{br} (V)
MOCVD	Sapphire	D-mode		$>10^7$	390
MOCVD	Sapphire	D-mode		10^{11}	400
MOCVD	AlN/Si	−2.17	0.177	10^8	178
PLD	GaN/Si	3	13.6	10^6	540
Exfoliation	SiO_2/Si	−7.3		$>10^6$	344
Exfoliation	SiO_2/Si	7	0.013	10^{10}	185
Ion-cutting	Al_2O_3/Si	D-mode	3	10^6	522
Ion-cutting	Al_2O_3/SiC	D-mode	0.101	10^7	1000
Fusion bonding	β-Ga_2O_3/4H-SiC	−50	0.065	108	2000

with a 30μm-long, 150μm-wide gate at 0.1V drain bias. The maximum drain current was 0.18mA/mm at 8V gate potential, and 20V drain bias. The on-resistance (R_{on}) was estimated to be 13.6kΩ-mm in the linear region.

The researchers also compare their work with other reported attempts to fabricate β-Ga_2O_3 TFTs on various heterogeneous substrates by various methods (Table 1). ■

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Tel: +41 81 403 8000
Fax: +41 81 403 8001
www.evatecnet.com

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Fax: +39 02 383 06 118
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Tel: +43 5672 600 2422
info@plansee.com
www.plansee.com

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Tel: +1 727 577 4999
Fax: +1 727 577 7035
www.plasmatherm.com

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Fax: +1 925 449-4096
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100 Sunnyside Blvd.,
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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
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Plasma-Therm LLC
(see section 6 for full contact details)

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Fax: +1 408 734 0961
www.samcointl.com

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Fax: +44 (0)1633 414141
www.spts.com

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Fax: +49 89 32007 162
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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
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Cambridgeshire PE29 6WR, UK
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Fax: +44 (0) 1480 424900
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10 Gas and liquid handling equipment

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www.cambridge-fluid.com

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11 Process monitoring and control

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Tel: +1 716 684 4500
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Bregstrasse 90,
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Fax: +49 7723 9197 22
www.wepcontrol.com

12 Inspection equipment

Bruker
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Fax: +49 (0)721 595 4587
www.bruker.com

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

13 Characterization equipment

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Fax: +1 402 477 8214
www.jawoollam.com

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575 McCorkle Boulevard,
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Fax: +1 614 818 1600
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14 Chip test equipment

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www.riff-co.com

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www.tek.com

15 Assembly/packaging materials

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4926 Spicewood Springs Road,
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Tel: +1 512 231 8083
Fax: +1 512 231 8183
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16 Assembly/packaging equipment

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www.pi-usa.us

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

17 Assembly/packaging foundry

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18 Chip foundry

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UK
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United Monolithic Semiconductors
Route departementale 128,
BP46, Orsay, 91401,
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Fax: +33 169 33 02 92
www.ums-gaas.com

19 Facility equipment

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www.rena-na.com

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20 Facility consumables

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21 Computer hardware & software

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www.semitech.us

22 Used equipment

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24 Resources

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France
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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

15–17 August 2025
2025 IEEE Workshop on Wide Bandgap Power Devices and Applications in Asia (WiPDA-Asia 2025)
Beijing, China
E-mail: registration@wipda-asia2025.org.cn
www.wipda-asia2025.org

27–29 August 2025
17th International Seminar on Power Semiconductors (ISPS 2025)
Czech Technical University in Prague, Czech Republic
E-mail: 13113@fel.cvut.cz
www.technology.fel.cvut.cz/en/isps

31 August – 4 September 2025
Energy Conversion Congress & Expo Europe (ECCE Europe 2025)
International Covention Centre, Birmingham, UK
E-mail: info@ecce-europe[dot]org
www.ecce-europe.org/2025

8–11 September 2025
51st IEEE European Solid-State Electronics Research Conference (ESSERC 2025)
Munich, Germany
E-mail:esserc@sistemacongressi.com
www.esserc2025.org

10–12 September 2025
SEMICON Taiwan 2025
TaiNEX 1&2, Taipei, Taiwan
E-mail: semicontaiwan@semi.org
www.semicontaiwan.org

10–12 September 2025
China International Optoelectronic Exposition (CIOE 2025)
Shenzhen World Exhibition and Convention Center, Shenzhen, Guangdong, China
E-mail: cioe@cioe.cn
www.cioe.cn/en

10–12 September 2025
The 7th Shenzhen International Semiconductor Exhibition (SEMI-e 2025)
Shenzhen World Exhibition and Convention Center, Shenzhen, Guangdong, China
E-mail: Info.Semi-e@informa.com
www.semi-e.com/email/2025/web/Brief.html

14–19 September 2025
22nd International Conference on Silicon Carbide and Related Materials (ICSCRM 2025)
BEXCO, Busan, South Korea
E-mail: icscrm2025@benepeople.co.kr
www.icscrm2025.org

21–24 September 2025
8th International Workshop on Ultra-Wide Bandgap Materials and Devices (IWUMD-2025)
Congress Centre, Wroclaw University of Science and Technology (WUST),
Wroclaw, Poland
E-mail: iwumd2025@pwr.edu.pl
https://iwumd2025.pwr.edu.pl/

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21–26 September 2025
28th European Microwave Week (EuMW 2025)
Jaarbeurs, Utrecht, The Netherlands
E-mail: eumwreg@itnint.com
www.eumweek.com

22–26 September 2025
42nd European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC 2025)
BEC Bilbao Exhibition Centre,
Bilbao, Spain
E-mail: pv.conference@wip-munich.de
www.eupvsec.org

24–25 September 2025
Microelectronics UK
Excel, London
E-mail: Enquiries@microelectronicsuk.com
www.microelectronicsuk.com

24–26 September 2025
PCIM Asia – International Exhibition and Conference for Power Electronics, Intelligent Motion, Renewable Energy and Energy Management (PCIM Asia Shanghai 2025)
Shanghai New International Expo Centre,
Shanghai, China
E-mail:pcimasia@china.messefrankfurt.com
www.pcimasia-expo.com

28 September – 2 October 2025
ECOC 2025: 51st European Conference on Optical Communication
Bella Center, Copenhagen, Denmark
E-mail:ecoc2025@cap-partner.eu
www.ecoc2025.org

7–9 October 2025
SEMICON West 2025
Phoenix, AZ, USA
E-mail: semiconwest@semi.org
www.semiconwest.org

7–11 October 2025
48th International Semiconductor Conference — CAS 2025
Hotel Sinaia, Sinaia, Romania
E-mail: cas@imt.ro
www.imt.ro/cas

8–10 October 2025
23rd International Symposium on POWER ELECTRONICS Ee2025
Novi Sad/Belgrade, Serbia
E-mail: dee@uns.ac.rs
www.dee.uns.ac.rs

12–15 October 2025
2025 IEEE BiCMOS and Compound Semiconductor Integrated Circuits and Technology Symposium (BCICTS)
Scottsdale, AZ, USA
E-mail: cs@cshawevent.com
www.bcicts.org

10–12 November 2025
12th IEEE Workshop on Wide Bandgap Power Devices & Applications (WiPDA 2025)
Fayetteville, AR, USA
E-mail: admin@wipda-europe.org
https://wipda.org/

18–21 November 2025
SEMICON Europa 2025
Messe München, Munich, Germany
E-mail: semiconeuropa@semi.org
www.semiconeuropa.org

30 November – 5 December 2025
2025 Materials Research Society (MRS) Fall Meeting & Exhibit
Hynes Convention Center, Boston, MA, USA
E-mail: info@mrs.org
www.mrs.org/meetings-events/fall-meetingsexhibits/2024-mrs-fall-meeting

6–10 December 2025
71st annual IEEE International Electron Devices Meeting (IEDM 2025)
Hilton San Francisco Union Square Hotel,
San Francisco, CA, USA
E-mail: iedm-info@ieee.org
www.ieee-iedm.org

4–6 February 2026
Asia Photonics Expo (APE 2026)
Level 1, Sands Expo & Convention Centre
(Marina Bay Sands), Singapore
E-mail: visitors-ape@informa.com
www.asiaphotonicsexpo.com

11–13 February 2026
SEMICON Korea 2026
Korea World Trade Tower, Seoul, South Korea
E-mail: semiconkorea@semi.org
www.semiconkorea.org/en

15–19 February 2026
2026 IEEE International Solid- State Circuits Conference (ISSCC 2026)
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